

NEW

From the makers of
**HISTORY
WAR**

BATTLE OF THE ATLANTIC

EXPLORE THE STUNNING
HISTORY OF WORLD WAR II'S
LONGEST CAMPAIGN



Digital
Edition

FUTURE

SEVENTH
EDITION



U-BOATS ★ BATTLESHIPS ★ BOMBERS ★ DESTROYERS ★ CORVETTES

A graphic of a ship's hull with crosshairs, overlaid with the title 'BATTLE OF THE ATLANTIC'. The word 'BATTLE' is in a large, bold, sans-serif font, and 'ATLANTIC' is in a slightly larger, bold, sans-serif font. The words 'OF THE' are in a smaller, bold, sans-serif font. A small logo on the left reads 'From the makers of HISTORY WAR'.

BATTLE OF THE ATLANTIC

For more than five years and eight months, the most gruelling and protracted struggle of World War II played out across the vast expanse of the Atlantic Ocean. The Battle of the Atlantic – a name coined by Winston Churchill – may have been far removed from the brutal, land-based combat on the Eastern or Western fronts, but it was no less significant. Wolf packs of German U-boats stalked and preyed upon enemy shipping convoys, while Allied commanders did everything to ensure that these vital lifelines to Britain weren't cut off. In this bookazine, you'll explore the events, technology and people that drove this unprecedented conflict. Through expert features, stunning photography and first-hand accounts, discover the incredible stories of genius, heroism and betrayal that shaped this vital part of World War II.

「 FUTURE 」

BATTLE OF THE ATLANTIC

Future PLC Quay House, The Ambury, Bath, BA1 1UA

Bookazine Editorial

Editor **Ross Hamilton**

Designer **Perry Wardell-Wicks**

Compiled by **Sarah Bankes & Perry Wardell-Wicks**

Senior Art Editor **Andy Downes**

Head of Art & Design **Greg Whitaker**

Editorial Director **Jon White**

History of War Editorial

Editor-in-Chief **Tim Williamson**

Senior Designer **Curtis Fermor-Dunman**

Senior Art Editor **Duncan Crook**

Cover images

Getty Images

Photography

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Advertising

Media packs are available on request

Commercial Director **Clare Dove**

International

Head of Print Licensing **Rachel Shaw**

licensing@futurenet.com

www.futurecontenthub.com

Circulation

Head of Newstrade **Tim Mathers**

Production

Head of Production **Mark Constance**

Production Project Manager **Matthew Eglinton**

Advertising Production Manager **Joanne Crosby**

Digital Editions Controller **Jason Hudson**

Production Managers **Keely Miller, Nola Cokely, Vivienne Calvert, Fran Twentyman**

Printed by William Gibbons, 26 Planetary Road, Willenhall, West Midlands, WV13 3XT

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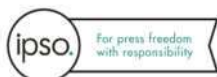
Chief executive **Zillah Byng-Thorne**
Non-executive chairman **Richard Huntingford**
Chief financial officer **Penny Ladkin-Brand**

Tel +44 (0)1225 442 244

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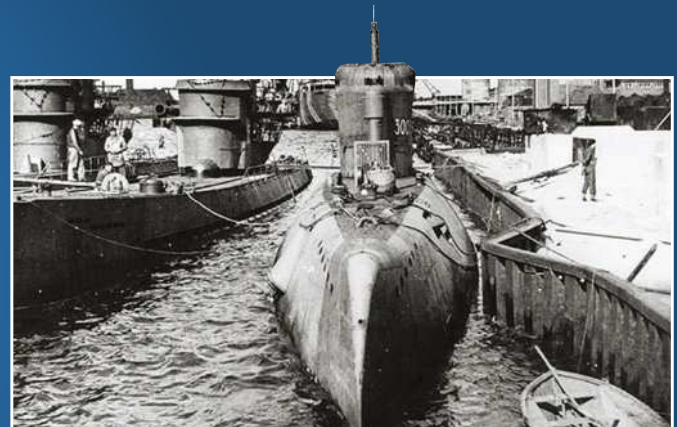
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A NEW KIND OF WARFARE

THE LONGEST-RUNNING CAMPAIGN OF WORLD WAR II, THE BATTLE OF THE ATLANTIC WAS FOUGHT IN A MANNER, AND ON A SCALE, THAT HAD NEVER BEFORE BEEN SEEN



The Anglo-Canadian convoy SC 42 left Nova Scotia bound for England on 30 August 1941. It consisted of more than 60 slow-moving merchant ships protected by four warships from the Royal Canadian Navy. Ahead of it lay 4,500

kilometres of wild ocean, temperatures cold enough to freeze the sea spray to the ships' handrails, and waves the size of tower blocks.

The crossing, which would take the ships a minimum of two and half weeks to complete, held a far deadlier threat than anything the environment could throw at them, however. Shortly after leaving port, the lumbering fleet got word from British intelligence that a vast wolf pack of German U-boats was prowling off the coast of Greenland. Ordinarily, such information would have allowed the convoy to reroute and avoid the waiting menace – but not this time. A storm had whipped up that was so ferocious that the convoy, with dwindling fuel, was forced to keep steaming along the doomed course fate had selected for it – directly into the U-boats' killing ground.

By now Britain had been at war with Nazi Germany for two years. Isolated from the rest of Europe for much of that time and blockaded by the German navy, it had relied on its ally Canada to keep it alive – literally. When Hitler's plan to invade the UK in 1940 faltered in the wake of the Battle of Britain, he switched tactics – if the island was a fortress, then he'd besiege it. Blitzed from the air and starved of supplies from the sea, the country was by this time nearing exhaustion. It was desperate for the supplies SC 42 was bringing. Much of it however, tragically never finished the journey.

The man Hitler had chosen to choke off Britain's food supply was Admiral Karl Dönitz.

A veteran U-boat commander from World War I, he was a brilliant tactician, utterly ruthless in battle and respected by his men. It was his controlling nature over the U-boat fleet, however, that would ultimately cost him what would soon come to be known as the Battle of the Atlantic.

In the autumn of 1941, it was a weakness that had yet to manifest itself in the outcome of this war under the waves; Dönitz was apparently winning the struggle. His U-boats were sinking nearly 150,000 tons of Allied shipping a month, and Convoy SC 42 was about to significantly add to that tally when, ten days into the crossing, it blundered into the jaws of the lurking wolf pack.

In the early hours of 9 September, the U-boats attacked their first merchant ship. Surfacing under cover of darkness to both keep pace with the convoy and avoid detection by the underwater sonar devices on the warships, the British freighter Empire Springbuck was the first to be picked off – all 39 of its crew were lost. When night fell the following evening, the U-boats struck again. Next to go was SS Muneric, with the loss of all 63 crewmen.

Hours later, another ship, the SS Baron Pentland, was damaged and abandoned by its crew. Within three hours, three more ships were destroyed. This continued for eight long days and nights. By the time SC 42 escaped the clutches of Dönitz's cut-throats, 16 ships had been sunk with the loss of more than 200 lives and thousands of tons of vital supplies. Back at his HQ in Brittany, where Dönitz had orchestrated the killings using charts and encrypted radio signals, these horrendous losses were toasted with fine local wines. Little was the Nazi admiral to know, however, that this was the last time his hunters would enjoy such overwhelming success.

“A STORM HAD WHIPPED UP THAT WAS SO FEROCIOUS THAT THE CONVOY, WITH DWINDLING FUEL, WAS FORCED TO KEEP STEAMING ALONG THE DOOMED COURSE FATE HAD SELECTED FOR IT – DIRECTLY INTO THE U-BOATS' KILLING GROUND”



■ As U-boats prowled beneath the surface of the ocean, the Allies' greatest form of defence came from the air



THE WAR UNDER THE WAVES

Increasingly sophisticated technology played a key role in determining who emerged victorious from the deadly duel on the high seas

Perhaps more than any battle in history, the one for control of the Atlantic shipping lanes during World War II demonstrated the importance of technology in warfare. Since humans first began engaging in organised conflict thousands of years ago, the victors have almost exclusively been those with the technological edge. When World War II began, it was the German navy, which had been preparing for war for years and who in Admiral Dönitz had a master strategist, that looked best prepared for victory. However, Britain, along with its ally Canada and later the US, developed an astonishingly rapid and sophisticated response to the U-boat threat that ultimately proved irresistible.

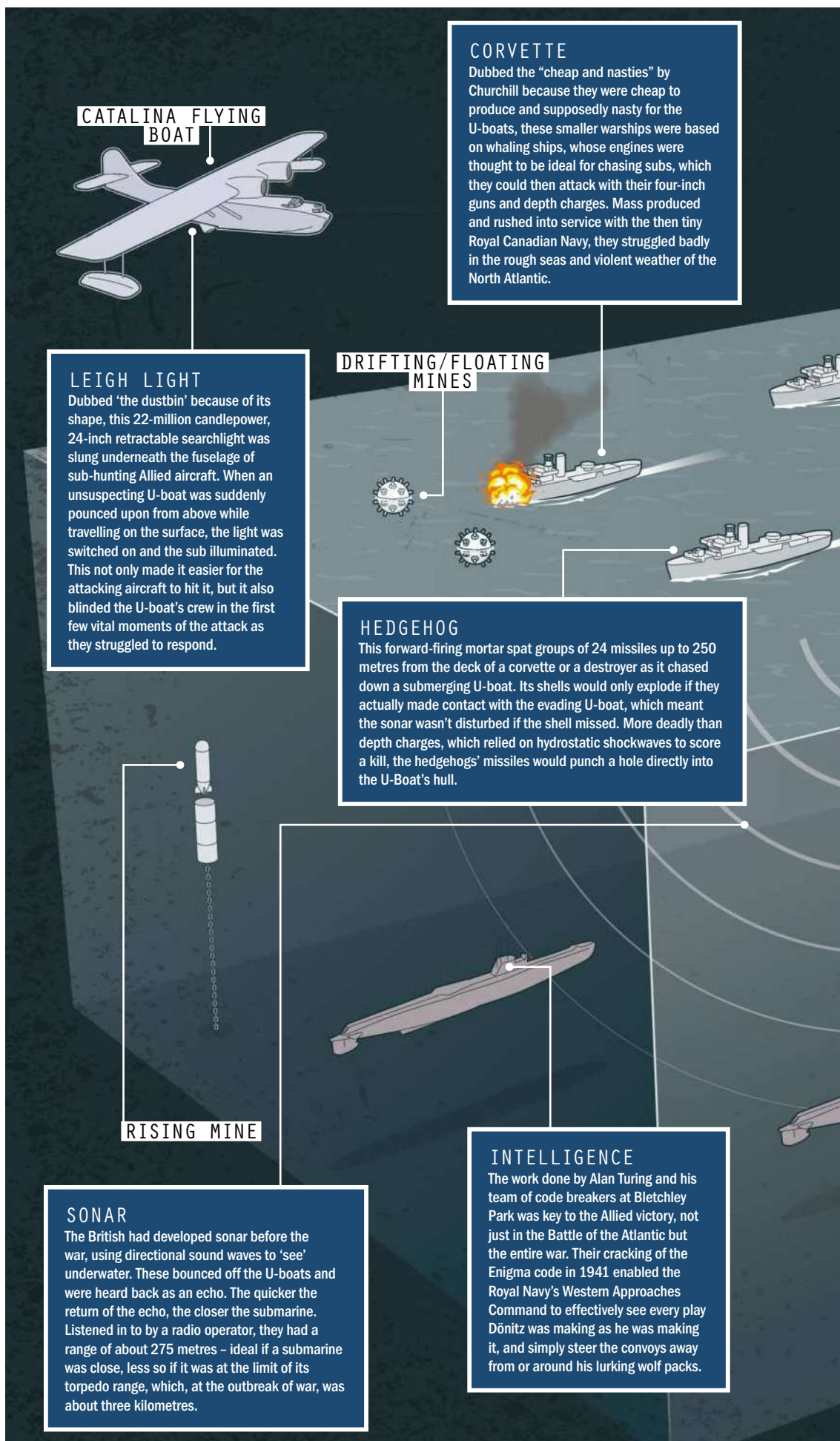
Dönitz insisted on a top-down command structure, ensuring he micro-managed every single engagement with Allied shipping from his war room, which from the summer of 1940 was in Lorient, Western France. This obsessive planning ultimately made his submarine crews vulnerable to intelligence leaks. With the cracking of Germany's supposedly unbreakable Enigma code in 1941, which Dönitz used to communicate with his U-boat commanders and move his wolf packs around his maritime maps, the fate of Germany's U-boat fleet was sealed. Then, with an array of ground-breaking detection devices and bespoke weaponry, it was eventually destroyed.



■ Ramming U-boats was another tactic used by allied naval commanders – often resulting in considerable damage to their own ships



■ Depth charges were fired off the side of Allied warships. The underwater explosions they created broke the U-boats' hulls with shockwaves



THE CONVOY SYSTEM

This was the key way merchant ships making the hazardous trip across the North Atlantic organised themselves. Travelling in large groups, they were protected by 'outriders' from the Royal Navy, the Royal Canadian Navy and the later the US Navy. Although there could be scores of ships in a convoy, because of shortages there were often just four warships accompanying them, which used a combination of sonar and radar to 'watch' for U-boats both above and below the waves.

B24 LIBERATOR

AIRCRAFT

Although aircraft were the U-boats' greatest adversary, early on in the war the Allies had no long-range planes capable of patrolling the entire north Atlantic. An area in the heart of the ocean known as the 'air gap' allowed the U-boats to hunt unhindered. As the war went on, however, planes such as the Consolidated PBY Catalina and bombers like the Consolidated B-24 Liberator were adapted so that they could fly longer distances.

FIDO TORPEDO

The US-built Mark 24 was a 310 kilogram torpedo that used two acoustic transducers (or antennae) that reacted to sound so that it could literally home in on its target. Measuring 215 centimetres long and 50 centimetres wide, it was dropped from aircraft and then, powered by a five-horsepower electric motor, propelled towards its target at a speed of 12 knots (the top speed of Dönitz's U-boats while submerged was just ten knots) delivering a 40-kilogram high-explosive warhead.

DESTROYER

The Royal Navy had about 180 destroyers when the war broke out. In the early stages of the conflict, these were the most effective weapon for defending convoys against submarine attacks. Fast moving and more heavily armed than the U-boats, they also had shallow hulls making them particularly difficult for U-boat commanders to torpedo them. By the end of the conflict, a further 277 destroyers had been commissioned, while 153 had been sunk – but only 28 to submarines.

MOORED MINES

TORPEDO MINE

DEPTH CHARGES

As they struggled to keep up with convoys while submerged, the U-boats often attacked on the surface and at night when their slender shape was hard to detect with binoculars. Once engaged by a warship or an aircraft, however, they'd need to dive to survive. Underwater, they were vulnerable to depth-charge attacks from above. These timer-controlled, high-explosive charges were jettisoned into the water in patterns, often exploding simultaneously above and below the submarine, sandwiching it in a blast.

"SINCE HUMANS FIRST BEGAN ENGAGING IN ORGANISED CONFLICT THOUSANDS OF YEARS AGO, THE VICTORS HAVE ALMOST EXCLUSIVELY BEEN THOSE WITH THE TECHNOLOGICAL EDGE"

BIRDS OF PREY

How aircraft became the key weapon for the Allies in containing and destroying the menace of Dönitz's wolf packs

The British rightly realised that air power was the key to defeating the U-boat scourge. Within weeks of war breaking out, HMS Courageous, one of the Royal Navy's seven aircraft carriers, was despatched to the Atlantic to hunt for subs. It had 48 Fairey Swordfish torpedo planes on board, and an escort of four destroyers. Courageous was patrolling the seas off northwest Ireland when, on 17 September 1939, it was sunk by U-29 with the loss of more than 500 crew. It was a devastating blow for the Royal Navy, which responded by restricting its remaining six carriers to areas where there was no risk of U-boat attack.

This presented a real problem, because Allied aircraft at that stage of the war simply didn't have the range to cover what was

effectively a huge battlefield. The air gap that opened up in the heart of the Atlantic now became the wolf packs' chief hunting ground.

To counter this, the Allies established air bases on Iceland, Greenland and the Faroe Islands, and set about trying to source aircraft that could close the gap further. Britain had considerable pre-war experience of the flying boat and their versatility proved useful during the early stages of the battle, but the ideal long-range maritime patrol aircraft needed to be based on a bomber design. Unfortunately, such aircraft were hard to find as the strategic aerial bombing of occupied Europe was, for much of the war, the only means Britain and the Allies had of hitting back at the Germans. The answer came in the shape of the Consolidated B24 Liberator.

Unlike modern submarines, German U-boats were not designed to spend weeks under the water. Rather they were viewed as torpedo boats that could dive as a defensive strategy. Once submerged they were reliant on battery power to propel themselves through the water. These batteries needed regular recharging – something that could only be done by the boat's diesel motors acting as a dynamo when the vessel was on the surface. In the early stages of the war, the U-boats could prowl around on the surface in the air gap pretty much untroubled. By 1942, however, once the Liberator had been fitted with both radar and Leigh Lights, and adapted to fly for longer, it was used, in conjunction with Dönitz's intercepted and decrypted communiqués, to effectively shut the air gap once and for all.

SHORT SUNDERLAND

OPERATOR: RAF COASTAL COMMAND, ROYAL CANADIAN AIR FORCE
IN SERVICE: 1938-59 **RANGE:** 2,848KM

With a crew of 11, equipped with Air-to-Surface Vessel radar (ASV), and armed with eight depth charges and as many as 16 .303 browning machine guns, the Short Sunderland was used to provide top cover for merchant convoys, patrol harbour approaches and hunt down Dönitz's wolf packs. This they did with huge success – some 60 U-boats were destroyed during the war by this particular aircraft. They were also used to pick up survivors of torpedoed ships despite not being designed to land on rough open sea. This heroic yet dangerous practice was eventually outlawed by RAF Coastal Command in 1942.

✦ A Short Sunderland prepares for take off

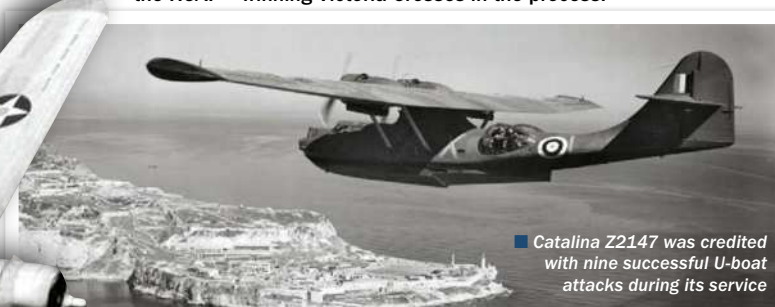


CONSOLIDATED PBY CATALINA

Operator: RAF Coastal Command, ROYAL CANADIAN AIR FORCE, US NAVY
IN SERVICE: 1936-57 **RANGE:** 4,000KM

Armed with five .50-calibre machine guns – including two waist gunners in the plane's distinctive 'blister' pods on its sides – and capable of carrying as much as 1,800 kilograms on its wings' bomb racks, this beast of a machine was crewed by ten men. Like the Sunderland, it was also equipped with ASV and undertook sub-hunting duties as well as convoy-protection missions. This ubiquitous plane managed to destroy 40 U-boats during the Battle of the Atlantic with two Catalina pilots – Flying Officer John Cruickshank of the RAF and Flight Lieutenant David Hornell of the RCAF – winning Victoria Crosses in the process.

■ Catalina Z2147 was credited with nine successful U-boat attacks during its service

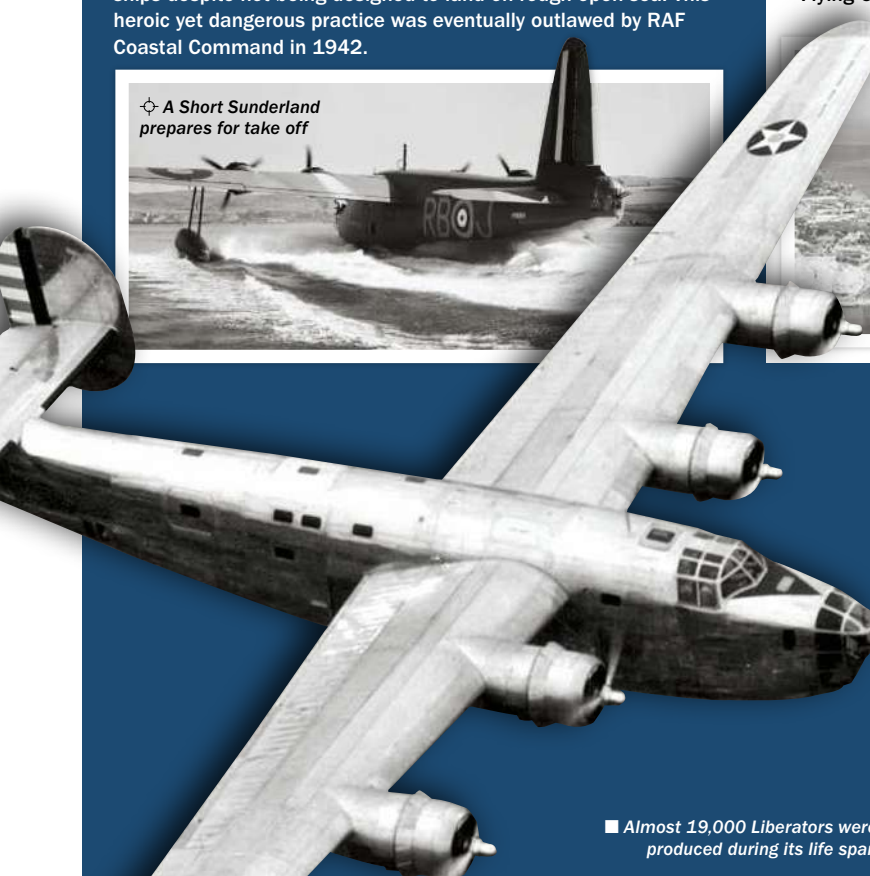


CONSOLIDATED B-24 LIBERATOR

OPERATOR: RAF COASTAL COMMAND, ROYAL CANADIAN AIR FORCE, UNITED STATES ARMY AIR FORCE, US NAVY
IN SERVICE: 1939-57 **RANGE:** 3,220KM

Produced in greater numbers than any other US bomber during World War II, the Consolidated B-24 Liberator was the key aerial weapon in the war against Dönitz's wolf packs. Crewed by ten men, once fitted with long-range fuel tanks from 1942 onwards it could stay airborne for up to 18 hours at a time. Armed with ten 12.7mm machine guns and equipped with ASV and the Leigh Light, it would attack with a formidable arsenal of weapons including torpedoes, bullets, bombs, rockets and depth charges. In all, B-24 Liberators managed to sink more than 70 U-boats during the Battle of the Atlantic.

■ Almost 19,000 Liberators were produced during its life span



"THE AIR GAP THAT OPENED UP IN
THE HEART OF THE ATLANTIC NOW
BECAME THE WOLF PACKS' CHIEF
HUNTING GROUND"



■ German submarine U-134
is attacked from the air

DEFENDING BRITAIN'S COAST

The system implemented to keep the U-boats of British ports out was ingenious and complex

Britain's ports played a pivotal role in protecting Atlantic convoys. After all, these were where the ships that confronted the U-boats sailed to and from, so it was little wonder they were highly valuable targets for U-boat attacks themselves.

The British had actually been aware of this possibility long before hostilities broke out. Indeed some of the technology the British would use – such as steel anti-submarine netting known as indicator nets draped across harbour entrances – had proved their worth in World War I when a number of German U-boats became ensnared in them and were subsequently sunk with depth charges. In fact, preparations were being made for a revival of the defence around Britain's more important ports as early as 1938.

Work readying the Clyde Estuary for war, for example, was started in the wake of the notorious Munich Conference, which British PM Chamberlain returned from promising the British people that war with Hitler had been averted. It hadn't, of course, and when hostilities broke out less than a year later, a huge steel indicator net had already been manufactured that was swiftly hauled into position to seal off the Clyde from U-boats.

Elsewhere around Britain's coastline, and indeed across its empire, these indicator nets – which could be as long as 100 metres and as deep as the sea bed they were suspended over – and an increasingly complex series of defences would play their part in keeping the U-boats out.

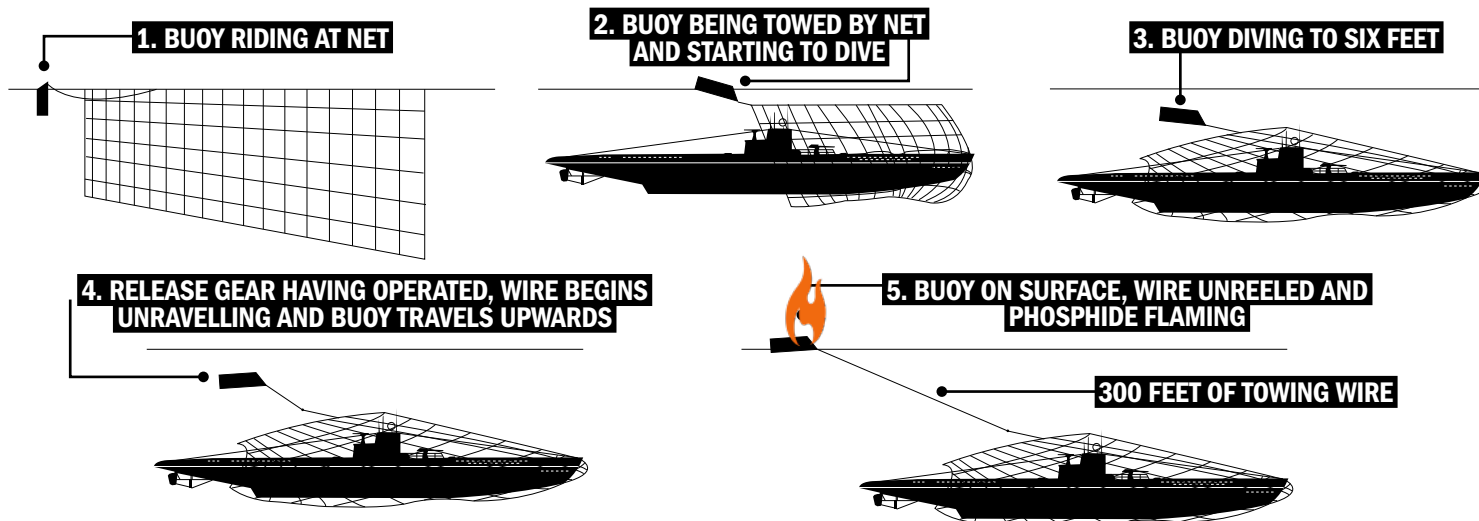
The nets, which had a series of rocket flares attached to them that would go off if a submarine tried to breach the defences, were also sometimes attached to converted fishing boats armed with machine guns and depth charges. Other methods of defence around British harbours included extensive minefields, sonar listening posts, radar stations, land-based gun emplacements, patrol ships, out-post observation ships, and of course regular sorties by aircraft from the RAF's Coastal Command. In combination, they proved highly effective.



■ Large wooden or metal floats, like these barrel floats, helped keep the huge suspended nets in place

PRAM INDICATOR BUOY WITH HYDROSTATIC RELEASE

When a U-boat became ensnared in an indicator net, the burning buoy gave away the enemy below



■ Anti-submarine nets were usually towed into position by boom ships and attached to buoys



THE GREATEST DISCOVERY OF THE WAR

When a British officer boarded an abandoned U-boat, he made a history-changing find

On 9 May 1941, U-boat ace Fritz-Julius Lemp, commander of U-110, attacked a convoy just south of Iceland. He hit two ships before being spotted by the British destroyer HMS Bulldog, which turned and raced towards him. Lemp, quickly realising the danger, dived, but it was too late. The Bulldog was soon on top of him, and he and his crew could hear depth charges crashing into the water.

Lemp's crew knew what was coming, and waited in agonising silence for the inevitable shockwaves from the explosions. When they came, they were horrific. "The vibrations were so bad," Georg Högel, Lemp's then 21-year-old radio operator, later recalled, "that we knew we couldn't escape. Lemp then gave the order to surface." As U-110 made its way up from the ocean floor to surrender, HMS Bulldog fired on it with every weapon it had. So intense was the fire that rained down upon it that when it surfaced, U-110's terrified crew poured from its hatches and leapt into the sea.

"Lemp stood on the conning tower shouting, 'Get out, everybody get out!'" Högel remembered. "Us two radio operators were down in the control room so we called out, 'What about the secret machines?' [Lemp replied,] 'Leave everything in there, get out!' He just wanted to save every man."

Lemp was killed in the confusion as his crew abandoned U-110 believing that it was sinking.

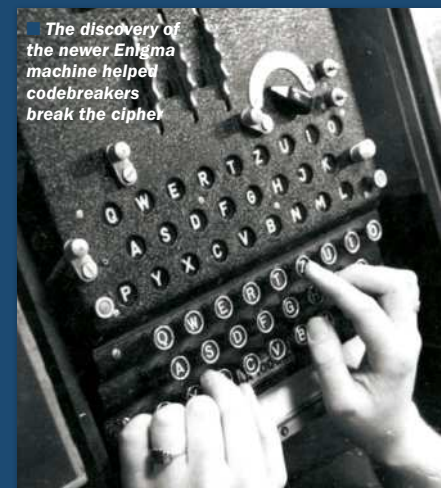
Somehow, though, the submarine stayed afloat. On HMS Bulldog, 20-year-old Sub-Lieutenant David Balme was then given the nod by his commander to lead a boarding party. "We rowed over," Balme recalled years later. "I got out and walked along the deck with my revolver pointing. All the hatches were open but you didn't know how many Germans might still be down below. That was the frightening thing because you needed both hands to go down those ladders. So I holster my revolver and gradually go down, and there I was in the control room. Absolutely silent, no Germans, just me. So I called my boarding party down and we started searching the U-boat."

What happened next was one of World War II's most significant events. As Balme's men searched the abandoned submarine, they found not only the U-boat's codebook but an intact Enigma machine – the secretive device used to encrypt and decrypt German radio signals.

The machines were raced back to the British codebreaking centre at Bletchley Park, where some of Britain's best minds had been struggling to crack Enigma's riddle. The machine, a more up-to-date version of the pre-war one they had been working with, swiftly provided a breakthrough.

Using it, Bletchley's star codebreaker Alan Turing identified a pattern in the first communiqués being intercepted each day between U-boat commanders and Dönitz.

Realising that these messages were weather reports, he slowly began to unravel Enigma, eventually developing the Turing bombe – a huge proto-computer capable of working through thousands of code variations simultaneously – to crack it. The chance capture of Lemp's Enigma machine became one the greatest pieces of good fortune in the history of warfare.



The discovery of the newer Enigma machine helped codebreakers break the cipher

■ The destroyer HMS Bulldog gave U-110 such a pounding that its submerged crew believed it was sinking. It wasn't and the vessel was captured





THE GERMAN MENACE

AT THE OUTBREAK OF THE SECOND WORLD WAR, FEW ANTICIPATED THE HAVOC THAT NAZI GERMANY'S KRIEGSMARINE WOULD WREAK



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The roots of the Second World War lay amid the carnage of 1918

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The U-boat service experienced success despite being plagued by weapons failures

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As lone hunters, U-boats were killing machines. When attacking in groups, they were devastating

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The commander of Germany's U-boat fleet pioneered the wolf pack strategy

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The leading German naval officers, from Jutland veterans to captains with secret ancestry

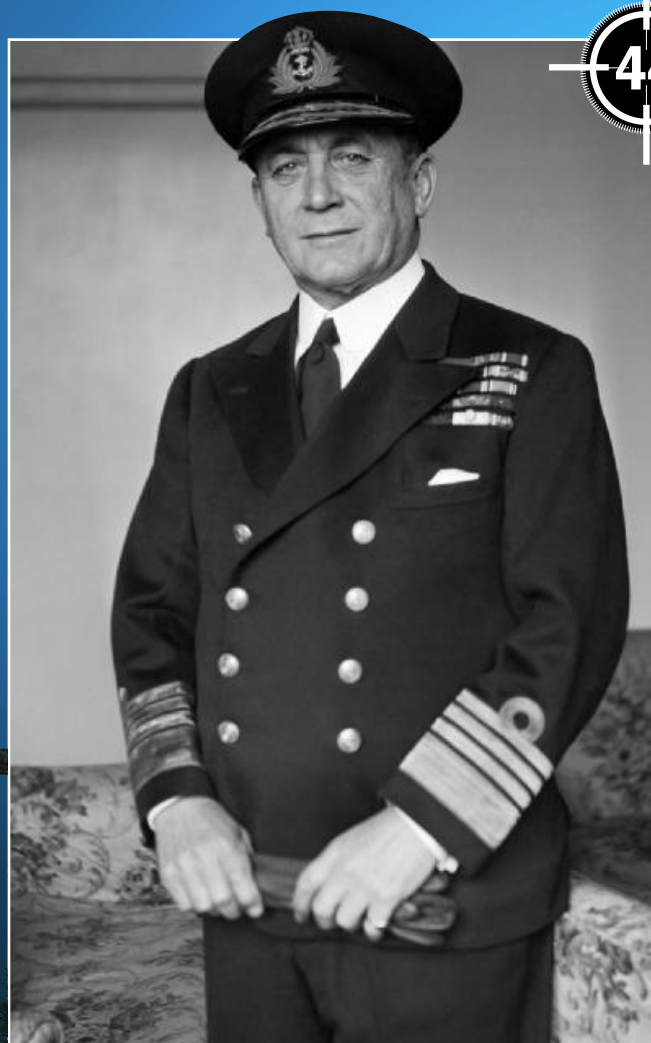
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The aircraft carrier gained everlasting fame during a brief but active career in World War II

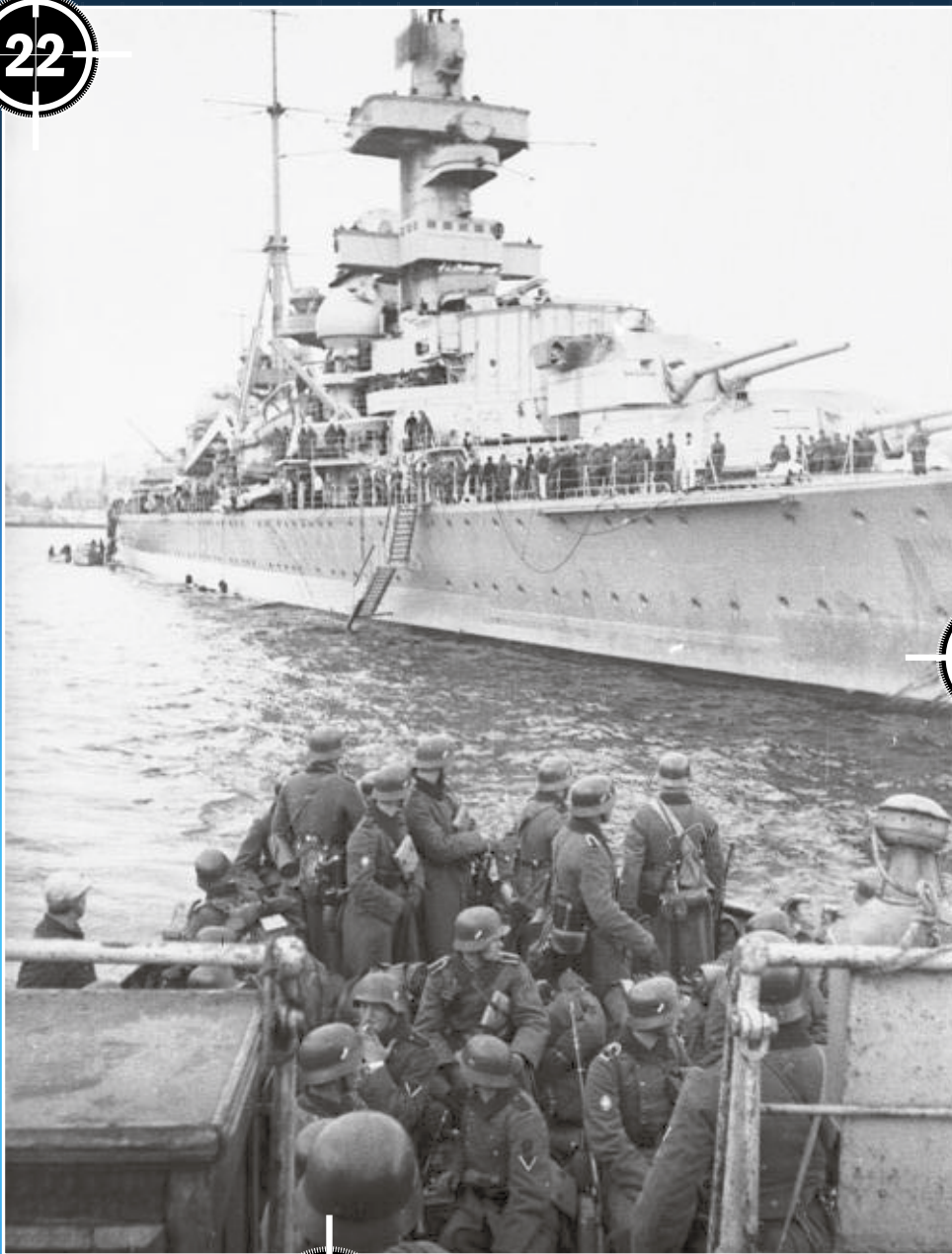
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Meet the commanders leading the charge to defend the British Isles from starvation

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THE ROAD TO WAR

THE ROOTS OF THE SECOND WORLD WAR LAY AMID THE CARNAGE OF 1918 AS GERMANY REFUSED TO ACCEPT THE HUMILIATION OF DEFEAT



The German Navy's Flag Officer for U-boats (Führer der Unterseeboote, or FdU), Kommodore Karl Dönitz, stood before the situation maps that adorned one wall of his temporary Wilhelmshaven headquarters. Small blue flags

marked the positions of all active U-boats; far too few for his liking, lost within the expanse of the Atlantic Ocean and North Sea. It was the morning of 3 September 1939 and he had only recently moved into borrowed offices within the Naval Radio Station. A more permanent headquarters was under construction in nearby Sengwarden, but until it was operational, he and his staff would work from the tree-lined avenue named Totenweg. At 11:00am GMT he received a curt radio message from his superiors in Berlin: 'War with England'. Only minutes later, a young aide burst into the room holding a teletype from Germany's Naval Signals Intelligence section (known as B-Dienst). The brief text was of a deciphered Royal Navy transmission: 'Most immediate to all His Majesty's Ships: Total Germany repetition Total Germany.' All present knew that the coded phrase instructed Royal Navy forces to begin hostilities with Germany.

Dönitz was visibly shaken by the news. Perhaps he had harboured hopes that the great gambler within the Reich Chancellery would manage yet another diplomatic coup that would avert war. As his Staff Officers fell silent, Dönitz abruptly left the room to collect his thoughts. Within half an hour he had returned with the air of renewed determination and resolve that led to his men nicknaming him 'The Lion' (Der Löwe). The first day of a new U-boat battle against Great Britain and its Empire had begun. Within hours, France had also declared war on Germany.

Dönitz, like his commander-in-chief Großadmiral Erich Raeder, knew very well the ramifications of conflict with a great naval power such as Great Britain. Both had served during the First World War that had ended with the German downfall of 1918, their nation then impoverished by harsh armistice terms and wracked by years of revolutionary turmoil. The rise to power of Adolf Hitler's National Socialist Workers Party in 1933 had brought a semblance of order to Germany, and the beginning of a secret rearmament programme to restore military strength forbidden by the Treaty of Versailles.

As the guns fell silent on 11 November 1918, Germany ended the First World War a broken nation. Bolshevik revolution sparked among the listless crews of the Imperial German Navy's

Grand Fleet that had lain at anchor for two years, and were soon fanned into the flames of full-scale revolt that spread throughout Germany. The harsh dictated terms of the Treaty of Versailles severely curtailed German military power, with U-boats, tanks and military aircraft strictly forbidden. Territorial losses, a forced acceptance of total responsibility for the outbreak of war and crippling reparation payments sowed seeds of resentment that took root in extreme politics. Unable to face the humiliation of defeat, many Germans took refuge within the myth that disloyal elements of the home front had 'stabbed the German soldier in the back'. Those perceived to be of questionable loyalty, notably socialists, communists and Jews, were viewed with suspicion and hostility and the atmosphere became ripe for Adolf Hitler's incendiary brand of politics.

For those like Dönitz who had keenly felt the dishonour of his revolutionary Navy, Hitler's promise of a revitalised nation that could once again stand alongside the world's other great powers was intoxicating. However, as war was declared, he knew that the German Navy (named 'Kriegsmarine' in 1935) was woefully unprepared for the struggle that would follow.

BRITAIN'S EMPIRE THREATENED

It was not only Germany that ended the First World War exhausted and weakened. Though Britain was amongst the triumphant nations and maintained its far-flung Empire, the country was indebted to the United States for £900 million in war loans, which was due for immediate repayment.

An island nation, Great Britain remained the world's pre-eminent naval power in 1918. The Royal Navy provided security for global imperial dependencies and the trade that the home nation needed to survive. However, the First World War had illustrated the vulnerability of those same trade routes that the Royal Navy sought to protect. Britain had been brought to the brink of collapse during 1917 by a U-boat force that numbered a total of only 105 boats, only half of which were suitable for high seas operations.

The prestigious surface battle fleets had been the focus of all navies at the outbreak of war in 1914, only a relatively few military visionaries realising the full potential of the submarine. Britain's admiral of the fleet, Admiral Sir Arthur Wilson, VC, had declared all submarines "underhand, unfair and damned un-English" in 1901, but it was a German



■ Neville Chamberlain, flanked by German foreign minister Joachim von Ribbentrop and Britain's ambassador to Germany, Neville Henderson, on his third and final visit to Hitler at the end of September 1938



PRIZE RULES

The archaic maritime law that was eventually abandoned in WWII

Dating to the earliest days of sail, Prize Rules governed the acquisition of equipment, vessels and cargo captured from an enemy belligerent. By the time of submarine warfare, the application of these rules demanded that suspected enemy vessels or ships carrying contraband through a declared blockade area be stopped and searched before either being sunk or taken as a 'prize' to the nearest friendly port. Furthermore, before any vessel could be sunk, all passengers and crew had to be moved to a place of safety. The rules were waived if target ships were clearly armed, displayed a persistent refusal to stop once requested or offered active resistance. U-boats entered WWII ordered to abide by Prize Rules, thereby robbing them of the element of surprise. The U-boats were also highly vulnerable to Q-ships: merchants heavily armed with concealed weapons designed to lure surfaced U-boats into range before opening fire. However, though feared by U-boat crews, the effectiveness of the Q-ship was somewhat exaggerated. During WWI, from a total of 150 engagements, British Q-ships destroyed only 14 U-boats and damaged 60 for a loss of 27 of their own.

Coupled with obedience of Prize Rules, U-boats entered WWII forbidden to attack any French ships as Hitler initially believed that he could agree an armistice with France. However, by 24 September this order was cancelled alongside a gradual loosening of restrictions on U-boat operations. British merchant ships were armed in response and Dönitz subsequently designated several British coastal zones as open to unrestricted submarine warfare; the areas gradually expanded until January 1940, by which time U-boats were free to torpedo suspected enemy ships without warning.

It had taken four months for the Kriegsmarine to reach a state of unrestricted submarine warfare, for which Dönitz would be charged with 'crimes against peace' at the post-war Nuremberg trials. Among his defence was an affidavit from Admiral Chester Nimitz who, in his role as commander-in-chief, United States Pacific Fleet, had ordered an unrestricted submarine campaign initiated on the first day of the United States' entry into war against Japan.





■ Adolf Hitler photographed here during the 1920s. A veteran of the previous war's trenches, he excelled at the revolutionary politics that dominated Germany, appealing to a widespread sense of aggrieved nationalism

U-boat that struck an initial blow to the Royal Navy by a demonstration of the weapon's destructive potential. On 22 September 1914, Otto Weddigen and his crew of 28 men aboard U-9 sank three British heavy cruisers in less than an hour, killing 62 officers and 1,397 men, leaving only 837 survivors. Against merchant shipping they were even more effective.

Initially, U-boats had obeyed 'Prize Rules', but on 1 February 1917, Germany unleashed an 'unrestricted campaign' that allowed U-boats to sink on sight any suspect ship, and Allied shipping losses rocketed. Within two months Britain faced defeat as starvation loomed and the country's war industries teetered on the brink of stoppage after U-boats destroyed nearly 900,000 tons of merchant shipping in April alone. Hidebound in tradition, the Royal Navy was unable to counter this most deadly menace. Only intense pressure from cabinet ministers and some clear-minded naval officers convinced them to adopt the Napoleonic strategy of convoying ships during May; from July onwards, the monthly losses never exceeded 500,000 tons. With that, Germany had lost its U-boat war.

'PEACE FOR OUR TIME'

Hitler's rise to power from the tumult of German politics culminated in his election as chancellor in 1933, followed by a referendum

"DÖNITZ MAINTAINED THAT TO STRANGLE BRITAIN'S MARITIME TRADE AND ESTABLISH AN EFFECTIVE BLOCKADE HE WOULD NEED 300 U-BOATS... AS WAR WAS DECLARED HE HAD 57"

to the German people during the following year that merged the post of chancellor and president; the new title of Führer und Reichskanzler (leader and chancellor) finally giving Hitler total dictatorial power. The race for rearmament intensified. During 1933, Germany had withdrawn from both the League of Nations, which had been established to foster international peace, as well as its disarmament conference in Geneva. The German delegation, headed by Josef Goebbels, had proposed international disarmament to Germany's level and been thoroughly rebuffed by France.

In 1935 Hitler formally repudiated the Treaty of Versailles and announced German rearmament following two years of covert development both within Germany and beyond its borders. Fearing that French intransigence would once again provoke a German-led European arms race, Britain signed a bilateral deal with Germany on 18 June that became the 'Anglo-German Naval Agreement'. In tacit acknowledgement of Germany's flagrant breach of the Versailles Treaty, the agreement limited the

Kriegsmarine's size to 35 per cent that of the Royal Navy, although there was a specific clause that gave Germany 'the right to possess a submarine tonnage equal to the total submarine tonnage possessed by the Members of the British Commonwealth of Nations.'

This agreement, which provoked strong French condemnation, was designed to allay fears of German expansionist aims in Europe. Combined with a German-Polish non-aggression pact signed in 1934, it appeared externally as though Nazi Germany was only interested in regaining an international standing denied by the Versailles Treaty. However, Hitler's rearmament plans were secretly set on supporting wider territorial ambition. During 1936 the Wehrmacht marched into the Rhineland, which had been demilitarized since 1918, in a direct contravention of treaty terms; the action was met by French protests and bluster but nothing stronger. During March 1938 Austria was amalgamated into the Third Reich and during September Hitler demanded the return of the Sudetenland that had been ceded to a newly created Czechoslovak

state after the First World War. British prime minister Neville Chamberlain met with Hitler in Berchtesgaden on 15 September and, following two further meetings, agreed to his demands. French prime minister Édouard Daladier followed suit three days later. The Czechs were not invited to either meeting, after which Neville Chamberlain declared from the steps of number 10 Downing Street that the accord signified “peace for our time”. On 15 March 1939, the Wehrmacht occupied the Czech provinces of Bohemia and Moravia, including Prague, and all illusions that Hitler’s ambition could be contained were finally dispelled.

BUILDING THE MACHINERY OF WAR

The likelihood of war with Great Britain had increased greatly since March 1939. Neville Chamberlain obtained French agreement to guarantee Poland’s independence and come to her aid if threatened. Incensed by the action, Hitler promptly renounced the Anglo-German Naval Agreement along with his non-aggression pact with Poland. With international tension rising, Großadmiral Raeder was gratified to learn of an intense building plan (named ‘Plan Z’) to bring about surface fleet parity with the Royal Navy. Privately, Hitler assured his naval chief that there would be no chance of war before 1944 at the earliest; ‘Plan Z’ was scheduled for completion by 1948. Raeder remained convinced that any naval struggle with Britain or France would be fought with grand fleets, despite Dönitz’s intense lobbying for consideration of his U-boat service.

The conflicting demands of German rearmament left the Kriegsmarine as the

orphan of all resource allocation. Priority was given to army and air force units and by the outbreak of war, none of the ships scheduled as part of ‘Plan Z’ had achieved any significant stages of construction. Within a year, the plan was scrapped and only those major surface vessels that predated ‘Plan Z’ were completed. The scarce resources would have been better used in U-boat construction. Mindful of 1917, Dönitz maintained that to strangle Britain’s maritime trade and establish an effective blockade he would need 300 U-boats: one third on station, one third in transit and one third undergoing refit and repair. As war was declared he faced the Royal Navy with 57 U-boats; only 20 of them suitable for Atlantic operations. Opposing the Kriegsmarine was a Royal Navy fleet that included seven aircraft carriers, 15 battleships and battlecruisers, 66 cruisers, 184 destroyers and 60 submarines.

On 1 September 1939, the Wehrmacht invaded Poland and within two days

Germany was at war with Great Britain, the Commonwealth and France. The first U-boat attack of the Second World War appeared an ominous portent of what was to follow. Despite firmly instructed to obey ‘Prize Rules’, the commander of U-30, Fritz-Julius Lemp, mistakenly identified a target ship as an armed merchant cruiser and torpedoed her without warning. That ship was in fact the 13,465-ton passenger steamer SS Athenia, which sank killing 98 passengers and 19 crew members. The war on Britain’s ocean trade links was about to begin, and in London the first lord of the admiralty, Winston Churchill, was in no doubt as to its significance: “The Battle of the Atlantic was the dominating factor all through the war. Never for one moment could we forget that everything happening elsewhere, on land, at sea, or in the air, depended ultimately on its outcome, and amid all other cares, we viewed its changing fortunes day by day with hope or apprehension.”



■ The U-boat came to encapsulate everything that the Allies feared and mistrusted about their German enemy between 1914 and 1918. This image of cold-blooded ruthlessness, encouraged by Allied propaganda, survived through to the next war



■ Kapitänleutnant Fritz-Julius Lemp talking to Dönitz on the conning tower of U30, August 1940. Lemp had just returned to Wilhelmshaven after a successful patrol and been awarded the Knight's Cross

EARLY EXCHANGES

THE U-BOAT SERVICE EXPERIENCED SUCCESS DESPITE BEING UNDERSTRENGTH AND PLAGUED BY WEAPONS FAILURES



There were 18 U-boats either on their patrol station or in transit from Germany that received the radio transmission announcing hostilities against Great Britain. While a small number of coastal Type II U-boats had been

unsuccessfully active within the Baltic Sea against Polish forces, most Type IIs were assigned to missions within the North Sea where their limited range and weapon load were not considered a handicap. The Atlantic was left to an initial wave of medium and large U-boats; Type I, Type VII and Type IX. Early adherence to Prize Rules did not allow them to patrol within British coastal waters and the inshore 'choke points' where merchant shipping converged before entering port. Forced to operate surfaced, they would have made tempting targets for land-based aircraft and naval escorts. Instead, the boats were initially stretched across a wide front that trailed from the tip of Ireland to the Gibraltar approaches within the lower Bay of Biscay.

However, on 7 September, 1939, two of those boats were withdrawn to port after intelligence reports indicated a probable initial reduction of British merchant traffic until October. Determined to mount a strong 'second wave', Dönitz cut his losses and the number of boats at sea. Nonetheless, within the Atlantic and North Sea during September, 47 merchant ships were sunk by torpedo, artillery, mines or scuttling charges; four ships were captured and taken by 'prize crews' to German ports and two other ships damaged. Kapitänleutnant Otto Schuhart also achieved the spectacular sinking of aircraft carrier HMS Courageous on 17 September, the carrier part of an anti-U-boat Royal Navy patrol 350 miles west of Land's End.

U-boats attempted their first two group operations during October, though they were only moderately successful; largely ineffectual due to a lack of U-boat numbers and the emerging torpedo crisis that would soon wreak havoc among Dönitz's men. Experiments at having a senior officer aboard on of the group's boats act as tactical commander were made but found to be impractical. Though it would be some time before group operations were attempted again, the decision was taken to



■ The invasion of Denmark and Norway took massive commitment from the Kriegsmarine. Here, the heavy cruiser Admiral Hipper is pictured unloading troops in Trondheim

use centralised control from FdU headquarters. This, of course, required regular and accurate radio contact to coordinate positioning. Though encoded with what Germany believed was the impregnable Enigma machine, events would show that this very nature of control would ultimately doom the U-boats of the Second World War to failure.

Though the offensive against merchant shipping was foremost in Dönitz's operational thinking, he also devoted a small quantity of U-boat resources to direct attacks on the Royal Navy. Most of these missions took the form of mining harbours, but also included Günther Prien's daring attack on the Royal Navy anchorage at Scapa Flow with U-47 and the successful sinking of HMS Royal Oak. A huge psychological blow to the British and propaganda victory for Germany, the attack also caused a relocating of other major warships from Scapa, some of which were subsequently damaged by mines.

During the opening months of the war, U-boats in the Atlantic attacked in three main 'waves' that peaked in September, October and then February 1940. However, following each patrol, extended dockyard time was required as combat conditions highlighted the early U-boats' mechanical or constructional deficiencies. Without sufficient dockyard space, a backlog in maintenance quickly created further problems at keeping sufficient U-boats at sea against the enemy. Nonetheless, despite only able to keep an average of six U-boats at sea daily between October and February, a steady toll was taken on Allied merchant convoys.

During March 1940, most U-boats were withdrawn in preparation for the invasions of Denmark and Norway that began on 9 April 1940. The Kriegsmarine was almost completely devoted to supporting amphibious landings

that stretched from Narvik in the Arctic Circle to the Danish-German border. U-boats were used extensively as protective screens against Royal Navy counterattack and it was here that the torpedo crisis was finally fully revealed when attempted attacks against major British surface ships resulted in unparalleled failure. Despite the unsuitability of U-boats in such a defensive role, there were a multitude of opportunities to torpedo warships and troopships which failed at every attempt. As the U-boats returned to dock for post-invasion repairs, the morale of the entire service had reached rock bottom. They were truly sharks without teeth.

RETURN TO THE ATLANTIC

For nearly three months the Atlantic had been free of U-boats due to the Norwegian invasion. During June 1940 they returned, operating primarily along the western reaches of the Bay of Biscay. British counter-measures mirrored those used during the First World War. A strong mine barrage was once again laid across the Strait of Dover, which sank three coastal U-boats (eight per cent of the operational U-boat fleet at that time) and rendered the English Channel unsafe for Atlantic transit. Instead, U-boats were forced to circumnavigate the British Isles, burning fuel and extending the time in which they were vulnerable to air and naval interception. Extensive North Sea minefields failed to prevent either the safe passage of U-boats or minelaying operations against British East coast harbours. Within the Atlantic, U-boat hunting groups built around aircraft carriers had aimlessly scoured the ocean for targets until the sinking of HMS Courageous caused the carriers to be withdrawn. These ineffective hunting groups

■ Propaganda was extremely important for the Wehrmacht and effectively handled. Reporters and photographers frequently accompanied U-boats into action to provide frontline news



THE TORPEDO CRISIS

The U-boat service entered combat in 1939 with a defective primary weapon

Indications of a potential torpedo problem were present from the opening shots of WWII. Lemp's U-30 sank SS Athenia with a torpedo, the first of a two-torpedo bow salvo while the second veered wildly off course. With Athenia's destruction, scant attention was given to the reported failure of his second shot. Yet, subsequent torpedo attacks were also frequently thwarted by erratic course and depth-keeping or by premature or failed detonation. For example, on 30 October 1939, U-56 hit battleship HMS Rodney with three torpedoes, each impact clearly audible aboard the submerged U-boat,



but none of which exploded. Aboard the battleship were the commander of the British Home Fleet, the first sea lord and first lord of the admiralty: Winston Churchill. The young captain of U-56, Kapitänleutnant Wilhelm Zahn, was so depressed by his failure that he was later transferred ashore to train recruits.

With morale plunging among his men, Dönitz ordered a thorough investigation that began to reveal what was in fact a 'perfect storm' of three separate issues previously unnoticed due to inadequate prewar testing. The first affected depth and course and was caused by the build-up of compressed air within a U-boat that occurred while submerged at length in action. This increased ambient air pressure, affecting the delicate gyroscopes that controlled both course and depth. The second was the effect that the Earth's magnetic field – particularly in northern latitudes like that off Norway – had on the insufficiently trialled magnetic detonators, which either failed to function or exploded prematurely. They were the alternative to the magnetic fuse, which failed to trigger detonation in anything but a direct hit on a flat target. The 'blades' that acted as detonators were smaller than the torpedo diameter and therefore the torpedo could bounce off an oblique hit and slide under the target ship's hull.

The Kriegsmarine investigated the matter and identified some of the problems, others only being revealed after years had passed. Although partially solved by June 1940, to a degree that allowed U-boats to operate effectively, they continued to wage war with a temperamental main weapon until after the Battle of the Atlantic had been decided.

THE RISKS
THEY RUN
FOR YOU

BOMB

SHELL

TORPEDO

MINE

Under the 'RED DUSTER' they sustain our Island Fortress



*Nearly one third of the world's
Merchant Ships fly the RED ENSIGN*

■ A British propaganda poster for an often undervalued merchant navy. The threats listed were accurate and very real

also took valuable military strength from convoy protection, limiting convoy size and prolonging the period in which significant numbers of merchant ships were encouraged to sail individually, providing easy targets if found by U-boats. By the end of June 1940, Norway and France had both fallen to German forces. While Norwegian ports provided additional refuelling and replenishment points for U-boats transiting to and from the Atlantic, it was the acquisition of the French Atlantic ports that altered the entire complexion of the German war at sea. Five captured harbours – Brest, Lorient, Saint Nazaire, La Pallice and Bordeaux – were designated as U-boat bases and over the months that followed had the necessary infrastructure installed. On 7 July 1940, Lemp's U-30 became the first U-boat to enter a French port when it docked at the end of its sixth war patrol in Lorient, new home of the 2nd U-boat flotilla. Once safely past Great Britain on their initial outbound voyage, the Atlantic U-boats were now permanently based on the fringe of the battleground itself.

By June, initial modifications to German torpedoes had partially remedied two of the major torpedo faults and U-boats were finally operating with greater combat efficiency. Dönitz was fully committed to what is described as a 'tonnage war'. The term 'tonnage' refers to a complicated calculation of a merchant ship's total internal volume – and therefore cargo-carrying capacity – and was expressed in 'Gross Register Tonnage'

"THE U-BOATS RENEWED THEIR CONVOY ASSAULT WITH EVEN GREATER ENERGY AND DETERMINATION THAN BEFORE. THIS PERIOD BECAME KNOWN AS THE 'HAPPY TIME', WITH MERCHANT TONNAGE SUNK BY U-BOATS SOARING"

(GRT). Dönitz's goal was to sink merchant shipping 'tonnage' to a level that could not be replaced, thereby reducing imports to a level that could no longer sustain Great Britain at war. In theory, it mattered not where such tonnage was destroyed, leading to the dispatch by Großadmiral Raeder of solitary heavy warships to distant parts of the South Atlantic in search of Allied convoys which could be pulverised by heavy guns. For Dönitz, the Schwerpunkt (focal point) of this war was in the mid-Atlantic, which now lay more vulnerable than ever to his French-based U-boats.

THE HAPPY TIME?

The U-boats renewed their convoy assault with even greater energy and determination than before. This period became known as the 'happy time', with merchant tonnage sunk by U-boats soaring between June 1940 and March 1941. At any one point during this period, the average number of U-boats at sea was 12 from a total of 26 frontline boats (not

including those in training or undergoing trials). Clearly, Dönitz was still far short of his desired ability to field 100 U-boats at any given time, but the success rate of those he could put into combat was astonishing. Within the ten months of the 'happy time', U-boats sank 2,321,086 GRT of shipping; nearly three times the amount sunk by surface raiders and three and a half times that sunk by German aircraft.

However, the U-boat war was by no means as one-sided as these numbers would suggest. While the term 'happy time' has become part of the historical lexicon when referring to those opening months of the Battle of the Atlantic, it was not one frequently used by U-boat crews themselves. This period was one dominated by the names of emerging U-boat 'aces' such as Günther Prien, Joachim Schepke, Erich Topp and Otto Kretschmer, the last of these becoming the highest-scoring U-boat commander of the Second World War. However, Kretschmer himself remained adamant in post-war interviews that it was far from a happy time, U-boat losses sometimes accounting for half of the operational boats within a given area.

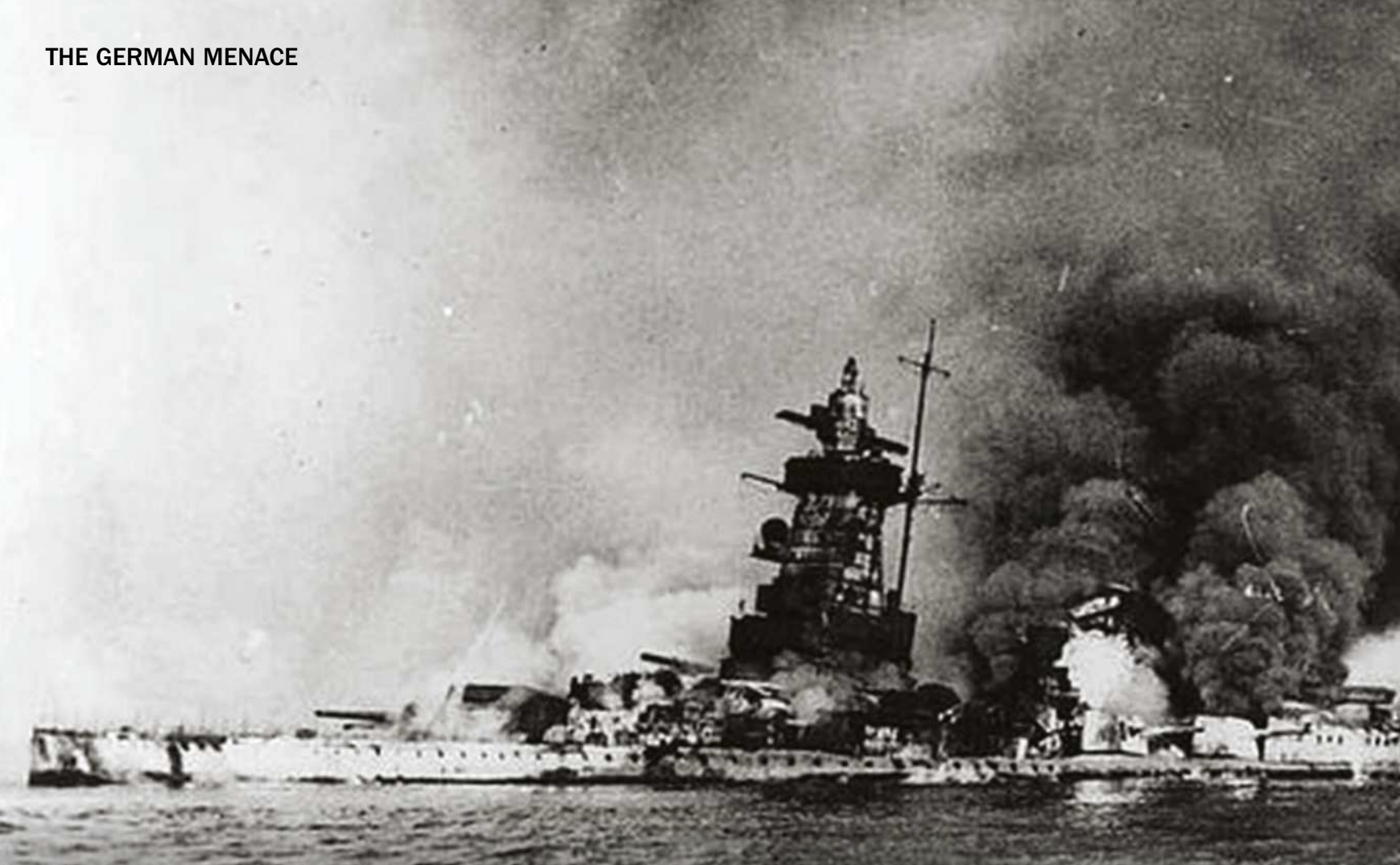


■ The acquisition of French bases also allowed small Type II U-boats to enter the Atlantic battle. Here U-61 is undergoing repair in Lorient, September 1940

Between June 1940 and March 1941, 15 U-boats were lost, including three of the four 'aces' mentioned earlier. Günther Prien and his crew disappeared, while both Schepke's U-100 and Kretschmer's U-99 were sunk by convoy escorts northwest of the Hebrides on 17 March. Kretschmer's highly successful combat technique was to remain surfaced while attacking: penetrating a convoy's escort screen and firing torpedoes from within the convoy itself, using the U-boat's high surfaced speed and low silhouette to remain invisible or outrun pursuit. That night, he was in his bunk when his executive officer sighted an enemy destroyer and dived the boat despite standing instructions to turn tail and run in the event of discovery. Pinned underwater where U-99's speed was drastically reduced, the U-boat was found by ASDIC and blown to the surface with depth charges from destroyer HMS Walker. Kretschmer ordered the damaged U-99 abandoned and scuttled, he and all but three of his men surviving to be captured. Less than half an hour previously, Schepke's U-100 was found in a rain squall by HMS Vanoc and rammed. Schepke was last seen waving his arms from the battered conning tower, his legs trapped, as the U-boat went down; only six of his men surviving the sinking. U-100 was the first U-boat detected and sunk with the assistance of technology that would become the bane of Germany's submarines: radar. If there had ever truly been a 'happy time', it was now over.



■ Otto Kretschmer, the most successful U-boat commander of the Second World War



THE DEADLY WOLF PACK

AS LONE HUNTERS, THE GERMAN U-BOATS OF WORLD WAR II WERE DEADLY KILLING MACHINES. WHEN ATTACKING IN GROUPS, OR 'WOLF PACKS', THEY WERE SO DEVASTATING THEY ALMOST WON WWII FOR HITLER...



Winston Churchill paces up and down his war room, his anxiety rising. It is the winter of 1940, the year is drawing to a close, and more bad news has reached his ears. Britain is suffering terrible casualties in the Battle of the Atlantic. The nation's war leader knows his besieged country is in grave danger; German U-boats are stalking the Atlantic's grey waters like packs of wolves. During 1940 alone they sink almost 500 cargo ships, totalling close to 2.4 million tonnes. Britain looks set to starve. "Our lifeline even across the broad oceans was endangered", Churchill would write in his acclaimed history, *The Second World War*. "I was even more anxious about this battle than I had been about the glorious fight called the Battle of Britain."

It was a fear well placed. During the first 16 months of World War II, U-boats destroyed

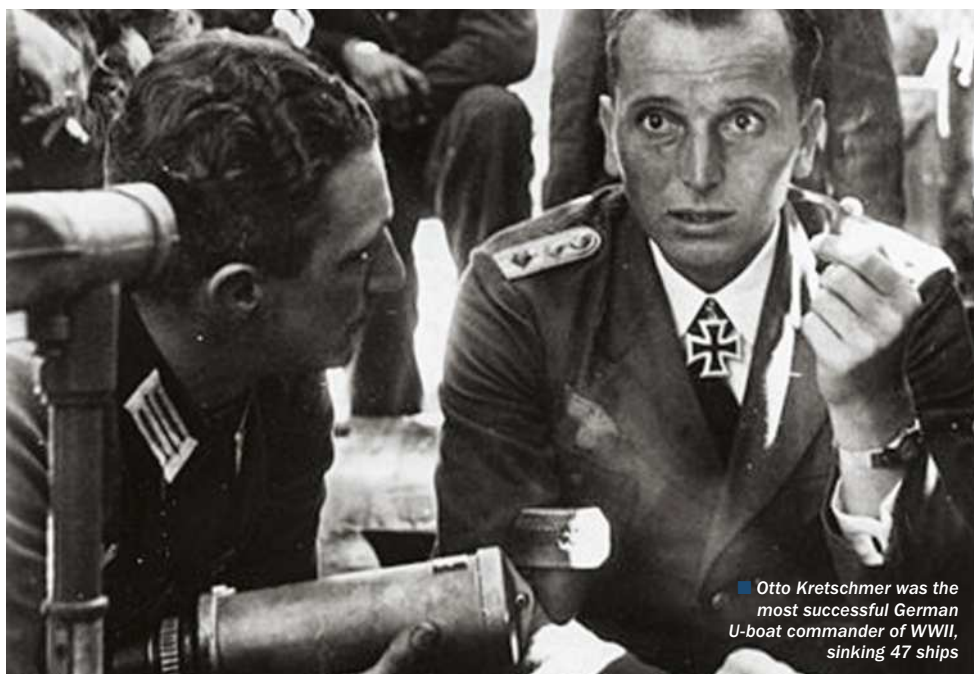
more than 700 Allied vessels. These silent killers were at their most lethal when their efforts were co-ordinated, in what came to be known as 'wolf pack' (wolfsrudel) attacks, and they scored a string of staggering successes – such as the harrowing of convoy SC-7, which German submariners dubbed 'the night of the long knives.' This violent confrontation unfolded on the evening of 18 October 1940, as an Allied flotilla of 35 merchant ships and six escorts sailed from Nova Scotia in Canada laden with vital supplies destined for ports in the United Kingdom.

The convoy was slow – a number of ships ferried steel ingots and iron ore – and proved easy prey for prowling U-boats. Three lone hunters, U-124, U-48 and U-38, sunk four ships on October 16 and 17. Then, on the following night, Admiral Karl Dönitz, the chief of the German U-boat Waffe, co-ordinated a five-sub wolf pack attack upon the remainder

of the beleaguered fleet. The results were understandably devastating.

Tucked away at his headquarters in Lorient, France, Dönitz ordered U-46, U-100, U-101, U-123 and U-99 – the latter captained by the deep-sea ace Otto Kretschmer – to engage the convoy in unison. U-boats usually hunted alone, though Dönitz had long championed pack tactics as the most effective way to attack and sink enemy ships. This overwhelming victory emphatically proved his point; 20 Allied ships, totalling almost 80,000 tonnes, were sunk or damaged at the cost of 141 lives. The U-boats suffered no casualties.

After the attack, Kretschmer in U-99 recalled that once he had penetrated the centre of the convoy, his boat sailed, "up and down the lanes looking for the most important and most valuable ships." Fuel tankers and munitions ships were among the most highly prized targets and these were often placed at



■ Otto Kretschmer was the most successful German U-boat commander of WWII, sinking 47 ships

the heart of the convoy for added protection. Kretschmer fired 12 torpedoes, sinking six Allied vessels and damaging another. "This was the first time that we had experienced these tactics", he continued in a passage recorded in *U-Boat*, Alan Gallop's definitive guide to the Type VII sub "and the first time Dönitz had been able to put the wolf pack plan to the test. The night became known as 'the night of the long knives' because so many ships were sunk."

In fact, the autumn of 1940 was known as 'The Happy Time' among the U-boat commanders and their crews. Between June and November they wreaked havoc in the Atlantic, sinking in excess of 1.5 million tonnes of merchant shipping. This was a true golden era for the U-boat *Waffe*, and Kretschmer was its golden boy.

Born in May 1912, Kretschmer joined the Reichsmarine of the Weimar Republic shortly before his 18th birthday and took command of

U-35 after just seven years of service. He was an inspired submariner and went on to become the most celebrated U-boat commander of WWII, earning the nickname Silent Otto thanks to his stealth tactics. His successes came thick and fast during the early years of the war and he helped pioneer the U-boats' most lethal killing techniques – attacking Allied ships from the surface while under cover of night.

Once surfaced for a night attack, a Type VIIB U-boat like Kretschmer's U-99, ran low in the water and even with its conning tower exposed was a difficult target to spot amid the ocean swell. In addition, the Allied ships' sonar equipment was redundant once the U-boat had surfaced. The vessel also moved quicker when on the surface where it could use its diesel engines, which powered the boat at around 17 knots (31 kilometres per hour) — when submerged and reliant on electrical power, the boat made little over seven knots

(13 kilometres per hour). This surface speed was invariably faster than the U-boats' heavily laden prey.

Wherever possible, Kretschmer attacked under the cover of darkness, with lone ships sometimes targeted by the 88-millimetre deck-gun in a bid to save the limited supply of torpedoes. Ideally, night attacks were to be executed with the moon ahead rather than behind the U-boat, so that the hunter remained in the shadows while the hunted was silhouetted in the water, and Kretschmer preferred to fire just one torpedo per target, rather than unleashing a fanned-out burst of three or four. The sub would dive for just a few hours each day, giving the crew some much-needed rest while the boat was hidden in the ocean depths. If undetected, it would then reload, resurface and launch another attack.

Though U-boats often operated as solitary instruments of war, they were often called

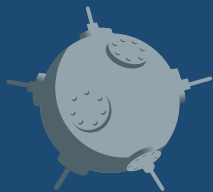
DEADLY WEAPONS

See how the wolf pack bared its teeth



TORPEDOES

The G7 torpedo was the primary U-boat weapon and a Type VII featured four forward torpedo tubes and one aft. The commander would calculate the necessary distances before unleashing the missile, which was launched via the use of compressed air. The missiles were often called 'eels' as they were long and greasy and ran in straight lines. The U-boats would have enjoyed even more staggering successes early in the war had the eels been more reliable; a high number of torpedoes fired in the first two years of the war failed to detonate.



MINES

The other primary offensive weapon aboard the U-boat was the mine and the Kriegsmarine developed specialised mine-

laying subs like the Type VIID and XB. Even a standard Type VII could carry mines, launching two or three at a time from its torpedo tubes. Though used less frequently than the other offensive weapons, mines could be highly effective. U-106, for example, sunk eight ships off the west coast of Africa in the spring of 1941 using this weapon.



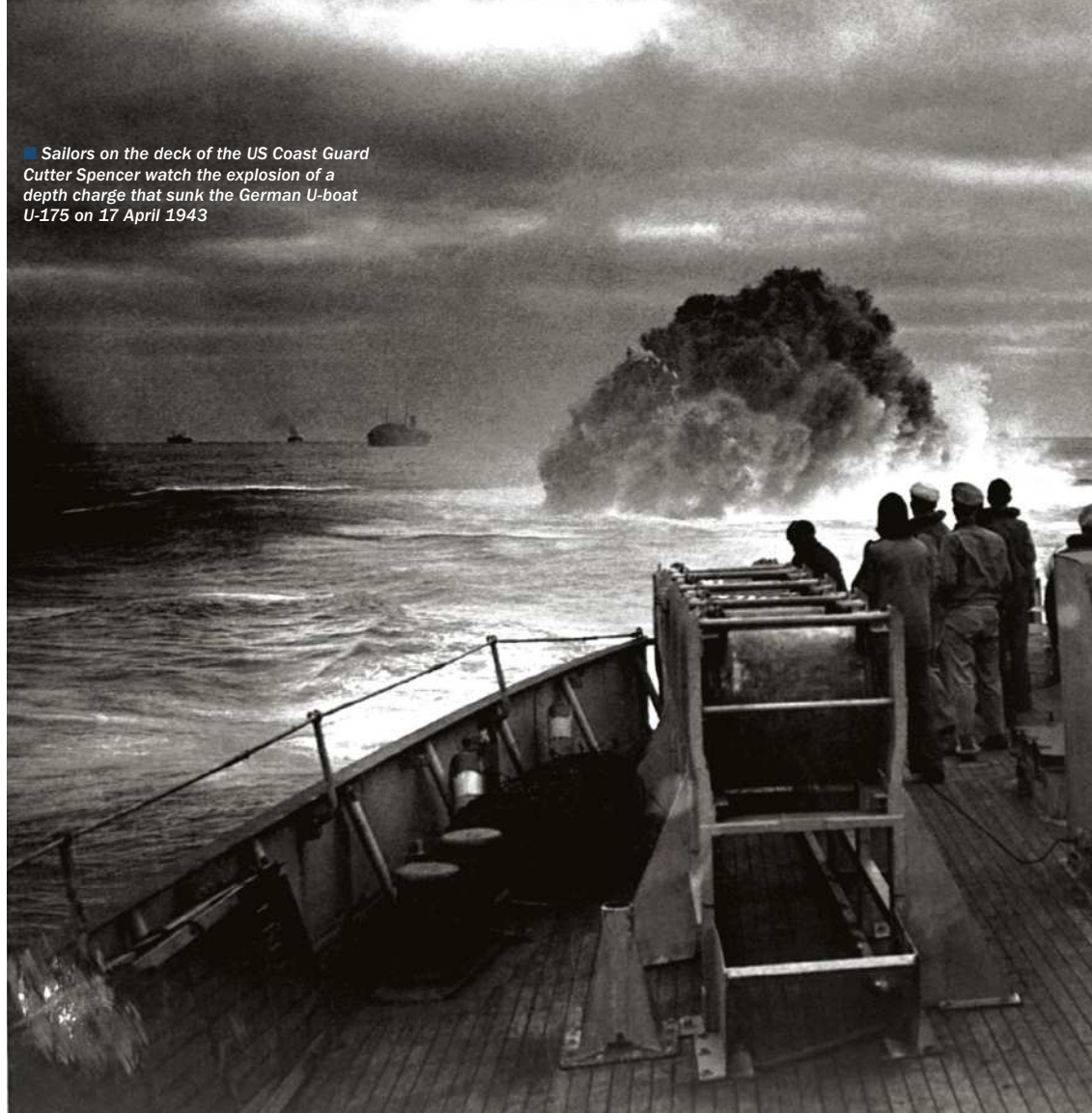
DECK GUNS

The Type VII usually carried a 88mm cannon on its deck that was used to dispatch solitary merchant ships that sailed without escort, thereby saving the limited number of eels. Given the increasing attacks on U-boats from the air, the Type VII's conning tower was regularly redesigned to allow the installation of anti-aircraft guns. The station to the aft of the conning tower was known as the 'winter garden' and usually housed a 20mm flak gun for defence against air attack.

together to hunt as a wolf pack, as with the attack on convoy SC-7. It is thought that around 250 different U-boat wolf packs were formed during WWII, coming together either for one-off engagements, or for missions that could last several weeks. Kretschmer proved a true pack leader, his exploits accounting for the destruction of 56 ships – in excess of 300,000 tonnes – before his capture on 17 March 1941. He fought to the very end, his capture coming the day after his crushing assault on convoy HX-112, where he sunk six ships, accounting for more than 43,000 tonnes.

His capture followed an unfortunate manoeuvre executed when Kretschmer

Sailors on the deck of the US Coast Guard Cutter Spencer watch the explosion of a depth charge that sunk the German U-boat U-175 on 17 April 1943



Following his capture Kretschmer spent almost seven years as a prisoner of war



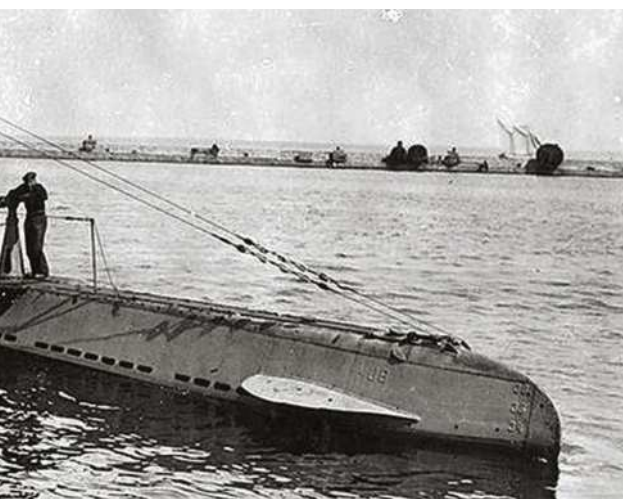
was below decks; his watch officer ordered U-99 to dive too early, thereby alerting HX-112's escorts, which were assisted by radar technology. The destroyers HMS Walker and HMS Vanoc unleashed a depth-charge attack that forced Kretschmer to surface and to eventually abandon ship. He saw out the remainder of the conflict in a Canadian prisoner-of-war camp. The U-boat Waffe was deprived of its greatest warrior.

Back home in Germany, men like Kretschmer were celebrated as great heroes and service in the U-boat Waffe was sold to the public as a glamorous life of high adventure. However, the truth was different. The life of a U-boat

crewman was extremely perilous, and it became even more fraught in the aftermath of the first Happy Time attacks, such as the pounding of convoy SC-7, which forced the British high command to rethink its wholly inadequate anti-submarine tactics.

The surface attacks perpetuated by Kretschmer and his fellow commanders bypassed the underdeveloped British sonar systems and it was only when radar came into play that the Allies began to put up some effective resistance against the U-boats. Indeed, the Allies owed the fatal 17 March strikes against Kretschmer's boat and U-100, which was commanded by another deep-sea

■ Captured German U-boats in Trondheim, Norway, shortly after WWII had ended



HOW THE U-BOATS KILLED

A three-step guide to hunting across the world's oceans

THE HUNT

Once an Allied convoy was identified a U-boat approached underwater, seeking a gap in the convoy into which the boat could sail. The U-boat then took a position at right angles to the column of ships, facing the largest target area. If a number of U-boats were to engage in a wolf pack attack, then one sub would be chosen to stalk the prey while the others were manoeuvred into position.

THE ATTACK

If the target was significant, the U-boat would strike at a distance of around 400-1,000m (1,300-3,280ft) with its torpedoes. A surfaced U-boat might use its 88mm deck gun, with its more plentiful shells. If torpedoes were used, a salvo might be fired at several targets at the same time, thereby minimising the convoy's response time. The furthest target would receive the first missiles.

THE GETAWAY

If the attack was successful the U-boat would slip away from the convoy, remaining on the surface where the sonar equipment could not find them. Once safe, it would reload its torpedo tubes and return to the attack. If the escorting warships detected it, the sub would try to outrun the ship on the surface before diving and disappearing back into the depths of the ocean.

ace, Joachim Schepke, to the use of radar. The U-boat Waffe developed a response but the U-boat campaign now entered a transitional phase. The Battle of the Atlantic was in the balance. From the late summer of 1941 when the now-famous code-breakers at Bletchley Park cracked the Enigma-encrypted radio communications between Admiral Dönitz's headquarters in France and his vessels out at sea, the tide eventually began to turn in the Allies' favour. It was not long before the hunters became the hunted.

The U-boats menace was never fully culled, however, and the submariners fought to the war's end. They enjoyed another prolific killing

spree — the Second Happy Time — during 1942, soon after America joined the conflict. It was during 1942 that Admiral Dönitz sent his Type VII boats to harangue America's eastern seaboard, the killer subs kept at sea for months on end, suckled by special Type XIV boats, known as 'milk cows', which carried vast stores of fuel.

As the head of the U-boat Waffe, Dönitz saw the United States' entry into the war as an opportunity to further devastate Allied shipping. The United States had no pipelines running up and down its coast, which meant huge tankers had to take to the waters to ensure its war-machine kept turning. Foolishly, the

American merchant vessels chose to sail with their navigational lights ablaze, hugging the brightly lit shoreline, their radios open, thereby announcing their positions to the U-boats lurking out at sea. The pickings were so rich that the German submariners dubbed this period 'the American shooting season' as more than 400 American ships were destroyed.

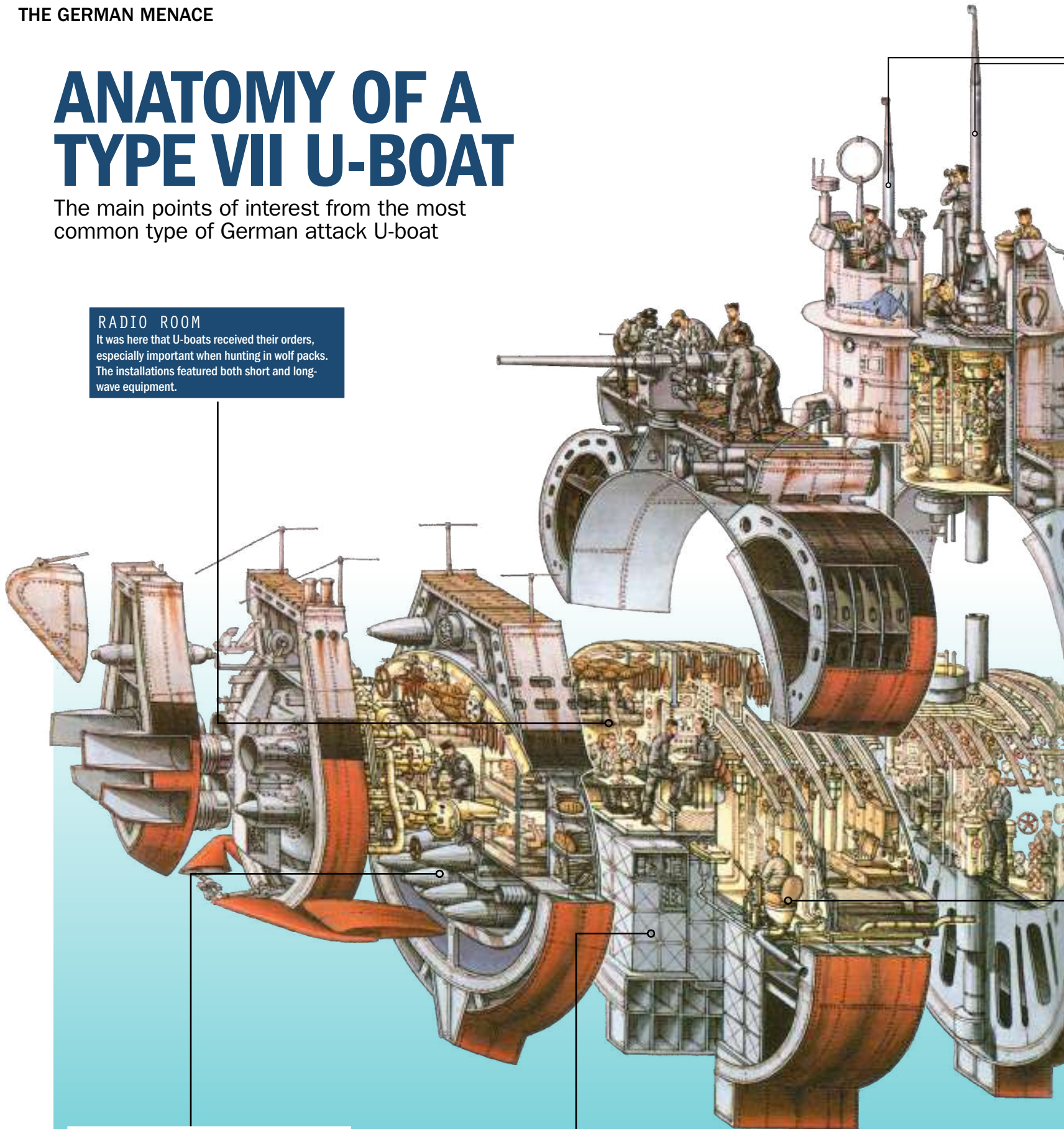
For all their success during the Happy Times, the U-boat crews still endured great hardship; life on board was dangerous, claustrophobic, dirty and not for the faint-hearted. When the sub came under attack, life was hellish. "When depth charges are added, life becomes a war of nerves," claimed the celebrated commander

ANATOMY OF A TYPE VII U-BOAT

The main points of interest from the most common type of German attack U-boat

RADIO ROOM

It was here that U-boats received their orders, especially important when hunting in wolf packs. The installations featured both short and long-wave equipment.



FORWARD TORPEDO ROOM

A Type VII carried 14 torpedoes, which were stored in every available nook and cranny. The torpedo room crew slept either in the smattering of bunks wedged between the missiles and equipment, or simply napped on the floor. The four torpedo tubes were the vessel's main weapons.

BATTERY COMPARTMENTS

The batteries powered the electricity on board the vessel, and also the electric motors that were used to propel the boat underwater. The diesel engines, meanwhile, were used when the boat ran on the surface.

PERISCOPES 1 AND 2

The boat's two periscopes crested the conning tower, which formed the main station for spotting Allied shipping. The control room was positioned immediately below. Men on the bridge were issued with special waterproof clothing, but this provided little protection from the waves crashing over the boat.

DECK WEAPONS

The 88mm deck gun was often employed against merchant shipping, especially if the ship was alone and an easy target. The anti-aircraft gun mounted behind the conning tower tried to fight off Allied air attacks.

MAIN CREW SLEEPING QUARTERS

The majority of the crew shared bunks that were housed off the central passageway. Each cot was 1.8m (5.9ft) long and 58cm (23in) wide and carried a thin mattress. A man on duty and a man off duty shared each bunk.

TOILET

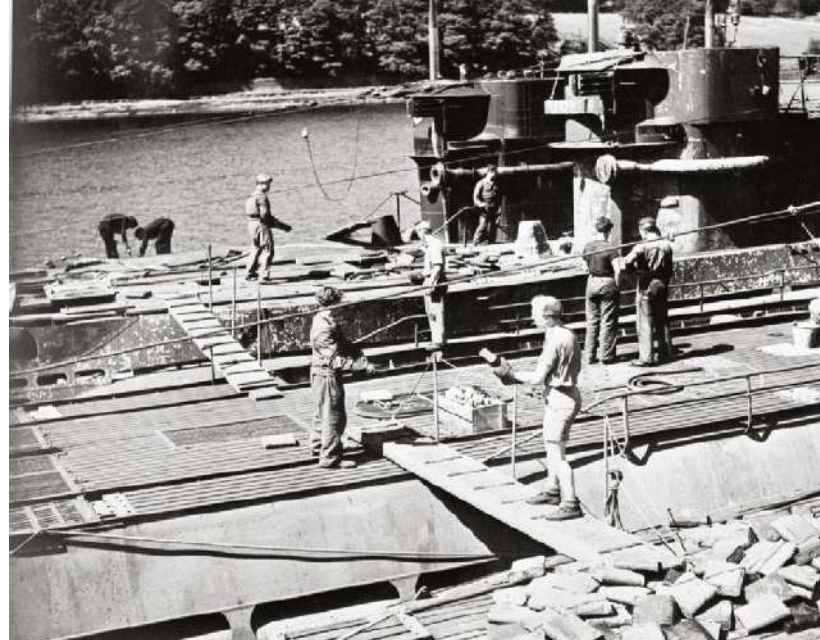
Though a Type VII had two toilets on board, one was usually decommissioned to allow for further storage, meaning a crew of over 40 men had to share one working toilet. The queues were long and the flushing system highly complex.

GALLEY

The kitchen was housed on the starboard side forward from the diesel engine room and featured a number of cookers and hotplates, as well as a small refrigerator and sink with hot and cold water.

THE GERMAN MENACE

■ Sailors on the deck of the U-boat U-123, somewhere in the Atlantic Ocean, 1940



TAMING THE WOLF PACK

How the Allies defeated the U-boat threat

The 'Happy Time' of 1940 came to an end for the U-boats as Allied anti-submarine warfare (ASW) capabilities improved. RAF aircraft were now equipped with radar and started to hunt boats on the surface. The first successful employment of radar against German U-boats brought about the neutering of U-99 and U-100 in March 1941. In May 1941, the improved Type 271 radar was fitted to British warships and in July the first High Frequency Direction Finder (HFDF) equipment was installed on Royal Navy ships. This could track U-boats, allowing the RAF and Royal Navy to target them. In 1943, the Allies seized the initiative when they put more escorts and carriers into the Atlantic and closed the mid-Atlantic 'air gap' by launching long-range bombers from North America, Iceland and the UK. During 1943, only 451 Allied merchant ships were lost, less than half the number sunk in the previous year.

Wolfgang Lüth in a 1943 lecture. "These blasts have a tormenting intensity. The lights go out and we sit in the dark, and when it is dark all men become more afraid. Unlike the plane, the submarine cannot fly away. All that requires stouthearted men."

Lüth, who ranks second only to Kretschmer, having sunk more than 220,000 tonnes of shipping across 15 different patrols, was one stouthearted man. He went on to say that life aboard a submarine was, "unnatural and unhealthy compared to life on a sailing vessel, just as unhealthy as city life compared to life in the country." He had a point. Once on board the crew was not permitted to use any fresh water for bathing or shaving, and each man was expected to wear the same clothes throughout the entire duration of the voyage.

Type VII submarines like Kretschmer's U-99, or Lüth's Type IX boats, like U-138 or U-181, operated with a crew of over 40 men, and each sailor had to share the confined space with hundreds of tons of fuel, equipment and weaponry. Every inch of space on board the sub was utilised; cooked meats hung suspended

from the overhead piping and the smell of diesel hung heavy in the odorous air. The overwhelming stench was part of everyday life for a U-boat crew.

The unsanitary nature of U-boat service was made all the more pronounced by the lack of sufficient toilet facilities. The Type VII, for instance, was fitted with two toilets, although one was invariably removed from service to make extra room for supplies, leaving the entire crew to share just one working system, which could not be used once the U-boat dived more than 24 metres (80 feet) below the surface.

A U-boat mission could easily last up to six months — Lüth once spent seven-and-a-half months at sea — and life on board could be monotonous until the action kicked in. "There is no constant change between day and night, for the lights have to burn all the time inside the boat," said Lüth. "There are no Sundays and no weekdays, and there is no regular change of seasons. Therefore life is monotonous and without rhythm."

Added to this monotony was the continuous climate in the boat. A U-boat might pass



from cold European waters to the tropics, but conditions inside would remain the same. No regular time was set aside for sleeping for the crew either, “since most of the fighting is done at night,” according to Lüth. When sleeping was permitted, the conditions were uncomfortable, with the majority of the crew sleeping in slim bunks that were slotted in either side of the central passageway. The men coming off duty clambered into a cot surrendered by a man going on duty – personal space was an unheard-of luxury. Those serving in the torpedo room and not housed in the smattering of bunks wedged between the equipment and missiles were forced to sleep on the floor.

When it came to mealtimes, officers and NCOs dined around a table, but there was no mess area in a Type VII; the rest of the crew ate where they stood. The quality of what they ate, though, was relatively good. Hitler’s navy, or Kriegsmarine, valued its submariners’ health and fed them well, especially at the start of the voyage as the cook worked his way through the fresh fruit and vegetables. Normally, alcohol was forbidden. “However, the men are very

grateful if they can take a swig from the bottle now and then on a special occasion, as when a steamer has been sunk,” said Lüth. Given the number of early successes enjoyed by Lüth’s and Kretschmer’s crews, these commanders must have seen their private booze supplies dwindle rapidly.

Those who served aboard the U-boats sacrificed much in the service of their country. Not only did they endure great discomfort and hardship during their everyday existence; they also suffered a shockingly high death rate. Close to 40,000 men served in the U-boat Waffe and all but 7,000 died at sea. Germany lost more than 750 submarines during WWII. Still, the deep-sea aces – warriors like Silent Otto, Wolfgang Lüth or Joachim Schepke – wrought chaos among Allied shipping. By the war’s end in 1945, the sea-borne marauders had sunk more than 14 million tonnes of merchant shipping; the German submariners were brave men and their gallantry deserves its place in the history books. Churchill was right to fear the U-boats – they very nearly cost him the war.

HUNTING BY NUMBERS

Germany’s wolf pack at a glance

20%

In 1945 only 20 per cent of U-boats leaving port were expected to return.

600

The Type VIIC was launched in September 1940 and became the most prevalent U-boat with more than 600 constructed.

220

A Type VIIC U-boat was 67m (220ft) long and could travel at 17 knots (31km/h) once surfaced.

50

When Germany surrendered in May 1945, around 50 U-boats were still at sea.

730

The Type VII destroyed 730 Allied ships during the first 16 months of WWII.

14 U-boats sunk

Around 2,840 of the 5,000+ merchantmen lost during WWII, accounting for more than 14 million tonnes.

THE GERMAN MENACE

■ One of Hitler's most trusted military commanders, Dönitz was eventually named as the Führer's successor



DÖNITZ: HITLER'S LION

THE COMMANDER OF GERMANY'S WORLD WAR II U-BOAT FLEET
PIONEERED A WOLF PACK STRATEGY TO HUNT ALLIED SHIPS



arl Dönitz was an accomplished Kriegsmarine commander, his innovative U-boat tactics responsible for the demise of countless Allied ships. Despite not being a member of the Nazi Party, he was a fanatical supporter of Germany's

aggressive international interests and believed that his methods could help bring the Allied war machine to its knees. Born on 16 September 1891 in the outskirts of Berlin, he was the son of an engineer and a housewife. His first taste of serving at sea came in 1910 when aged 18 he signed up as a sea cadet in the Kaiserliche Marine (Imperial German Navy). Dönitz immediately showed a gift for leadership and initially served as an airfield commander. He soon grew tired of the post he had been assigned to and requested a move to the submarine service. This was approved and he stepped aboard his first U-boat, UC-68 as a Watch Officer before taking command of UC-25 and then UB-68 in 1918. His first taste of submarine leadership was curtailed after UB-68 was sunk by British warships off the coast of Malta. Dönitz was captured and imprisoned until after the war's end.

Undeterred by Germany's catastrophic loss in World War I and the sanctions placed on the military by the Treaty of Versailles, Dönitz enlisted in the Weimar Republic Navy. By 1928 he had been promoted to the rank of lieutenant commander and captained the training cruiser, Emden. He spent a significant amount of time on board the ship, training the next generation of naval cadets in round-the-world trips. Adolf Hitler and the Nazi party's ascent to power in the Reichstag resulted in significant changes in the German Navy. Choosing to ignore the restrictions put upon the armed forces at Versailles, the Führer secretly directed extra funds and manpower to the newly formed Kriegsmarine. This included the return of U-boats. Dönitz was one of the men tasked with command as he took charge of a U-boat flotilla. It was now clear to the Berliner that in a future conflict, submarine warfare would play a major role.

IN COMMAND

Dönitz was appointed Führer der Unterseeboote (commander of submarines) in 1936. He was now one of the world's leading experts in submarine warfare and Hitler was confident that this section of the Kriegsmarine would play a key role in the Third Reich's war machine. German submariners were trained to employ group hunting tactics that would pursue and then destroy enemy ships carrying troops or cargo. This 'wolf pack' strategy would be the

Blitzkrieg of the water in the first few years of the war. So confident was Dönitz in underwater warfare, that in 1937 he requested that the entire Kriegsmarine be turned into submarines. This, he believed would be the best way to starve Britain into submission in a future war. His appeal was flatly turned down by his superior, Großadmiral (grand admiral) Erich Raeder. Raeder was born of an older generation and was much more of a traditionalist. A veteran of the Battle of Jutland, he liked nothing more than the sight of a grandiose battleship like Tirpitz; he was convinced that cruisers were still a significant part of naval warfare and considered submarine attacks as cowardly. Eight months before the Wehrmacht thundered into Poland, Dönitz was promoted to commodore and tasked with the leadership of every submarine in the navy. He realised that Germany's navy lagged behind both the army and the air force. He had previously stated that 300 Type VII U-boats would be enough to defeat the Royal Navy, but found himself

with only 22 of these vessels, and 57 U-boats in total, after war was declared. Clashing with Hermann Göring after an argument over Luftwaffe funds being redirected to the Kriegsmarine, Dönitz took a backseat for the first year of the war. Rather than targeting merchant shipping to try to cripple Britain's trade, early raiding campaigns were launched such as the attack on Scapa Flow, which sunk a British carrier and a battleship for moderate U-boat losses. Shortly after, Dönitz got his wish and the era of feared U-boat wolf packs began. Working in long lines of communication, once an Allied convoy was sighted, all U-boats in the area would be summoned and the enemy vessel would be torpedoed to oblivion. This, coupled with Dönitz's promotion to vice admiral in September 1940 and the arrival of more and more Type VII's, made it a profitable period for Dönitz's tactics as his wolf packs decimated huge amounts of British merchant traffic. When Hitler declared war on the USA on 11 December 1941, its ships were to be the next victims.

"THE ERA OF FEARED U-BOAT WOLF PACKS BEGAN. WORKING IN LONG LINES OF COMMUNICATION, ONCE AN ALLIED CONVOY WAS SIGHTED, ALL U-BOATS IN THE AREA WOULD BE SUMMONED AND THE ENEMY VESSEL WOULD BE TORPEDOED TO OBLIVION"



Dönitz and his wolf packs came unstuck later in the war against superior Allied technology and resources



■ Dönitz in the custody of the British army after his arrest in 1945. He was tried at Nuremberg and sentenced to ten years

GROßADMIRAL

Hitler's warmongering with the USA is often seen as one of his greatest mistakes. However, at the time, Dönitz was delighted as it gave him another opportunity to unleash the U-boats on the Allies. In fact, the vice admiral had been encouraging the Führer to do so for months. Hitler was fast coming round to the idea of submarine warfare and Dönitz's stock was rising fast as he began to rival Raeder in the Führer's affections. Back in the Atlantic, unescorted American ships were being routed.

The Kriegsmarine had successfully driven a wedge between British and US flotillas and now had the advanced Type IX U-boats at its disposal as more and more Allied tonnage was sunk. Every move was being orchestrated by Dönitz from his war room in Lorient, Brittany in occupied France. In his headquarters he had estimated that German U-boats needed to be sinking 750,000 tons of Allied shipping every month to successfully bring the enemy to its knees. As it turned out, this was out of reach for the Germans and even at their peak

they could only sink a maximum of 637,000 tons, a nevertheless impressive feat that was attained in June 1942. Dönitz's dynamic leadership was rewarded with a Knight's Cross and a promotion to admiral. Finally, he was receiving the extra U-boats he craved. From the summer of 1942 until the end of the year, 30 new U-boats were pressed into service every month. Unfortunately, there were only negligible technological upgrades and with each casualty, U-boat captains were becoming less well trained. Success in the Battle of the Atlantic now depended on Dönitz's strategy more than ever. Later that year Enigma, which was used by Dönitz's to relay secret messages between U-boats, was cracked. Initially, this only had minor effects on the war at sea as the Kriegsmarine still held the upper hand.

Dönitz was promoted once again, this time taking the resigning Raeder's place as grand admiral on 31 January 1943. The new leader celebrated his achievement by flying a commander-in-chief's flag over his headquarters and reassuring the German

people that he would "fight to a finish" in a campaign that would be "waged with still greater vigour and determination than hitherto."

FIGHT TO A FINISH

As grand admiral, Dönitz utilised a top-down structure. This way he was able to monitor the movements of his vessels personally. The move paid off as he skilfully coordinated the wolf packs along with supporting reconnaissance aircraft and other vessels. However, no matter how successfully Dönitz synchronised his movements, British and US admirals had got wise to the U-boat threat and were implementing new and improved technology that would blast them from the depths. The dream of blockading the British Isles was fading fast. Dönitz did recognise the Kriegsmarine's dire need to advance its technologies, but it was too little too late.

The blockade was abandoned in May 1943 and the next two years leading up to the end of the war were frequent drawbacks punctured by

DEFINING MOMENTS

TYPE VII U-BOAT

THE SMALL SUB WITH LIMITED FIREPOWER

From the start of the war, Dönitz concentrated his strategy on the Type VII U-boat. Small with a short range, he believed that it would be able to provide the Kriegsmarine with all the submarine firepower it needed to defeat the Royal Navy. The craft wasn't as much use further out in the Atlantic and began to struggle when the USA entered the war. It was superseded by the improved Type IX, but the glut of Type VIIIs demonstrated how unprepared Germany was for full-scale war at sea.

THE SECOND HAPPY TIME

U-BOATS ENJOY MORE SUCCESS

Beginning in late 1941, long-range German Type IX submarines were targeting the USA. Known as Operation Drumbeat or the Second Happy Time, U-boats made a string of successes sinking a number of Allied vessels. This lasted for around seven months with the first U-boat casualty being as late as 12 April 1942 when U-85 was sunk. In total, 609 Allied ships equalling 3,100,000 tons were sunk in the operation, which was the last great hurrah for Dönitz and the Kriegsmarine.

THE BROTHERS DÖNITZ

BOTH WERE KILLED IN ACTION

Both of Dönitz's sons served in the Kriegsmarine during World War II. His younger son Peter gave his life for his country at the age of 21, dying on U-934, which was sunk on 19 May 1943. The loss persuaded his father to allow Peter's older brother Klaus to leave active service in the Kriegsmarine and study to become a doctor. Going against orders, Klaus died aboard a torpedo boat that was sunk off Selsey, England on 13 May 1944. Karl's daughter Ursula meanwhile married U-boat commander Günther Hessler.

■ Historians speculate that Dönitz could have defeated Britain by sea power alone had Hitler given him the right support and funds



sprurts of success. New U-boats including the Type XII and the advanced yet short in supply Type XXI were rushed into action. Yet slowly but surely, Dönitz's forces were driven from the Atlantic as Allied microwave radar picked off the remaining wolf packs. The Royal Navy was now actively seeking out U-boats, not avoiding them, and the Kriegsmarine was fighting a campaign it couldn't win. He may have been a brilliant U-boat commander but Dönitz did not take the life of the average submariner into account and continued to send outdated U-boats out against the vastly technologically superior enemy.

As the Third Reich creaked under the strain of the advancing Allied armies, Hitler became increasingly paranoid and reckless, trusting almost no one. One commander he did have confidence in was Dönitz and as the Wehrmacht was being pushed to breaking point, he appointed him as the head of the Northern Military and Civil Command on 20 April 1945. Dönitz got the ultimate promotion less than a month later as the Führer selected him as his successor.

Assuming the role of Reichspräsident, he became the final leader of the crumbling Third Reich. As Reichspräsident he attempted to save as many German lives as possible, advising citizens to travel west away from the advancing Soviets and attempting to negotiate good terms of surrender for Nazi Germany. The unconditional surrender was signed with the Western Allies in Reims on 7 May and then with the USSR a day later in Berlin. After the war, Dönitz was tried at Nuremberg. He was judged to have been an advocate of Nazism and was considered a major war criminal. He was imprisoned for ten years and died on Christmas Eve 1980. Karl Dönitz is remembered as a master tactician who was a constant thorn in the side of Allied shipping operations. If given more resources, he could well have made the Battle of the Atlantic a more tightly contested affair.

■ The cruiser Emden, which Dönitz commanded for a year during the interwar period



AXIS COMMANDERS

THE LEADING GERMAN NAVAL COMMANDERS, FROM JUTLAND VETERANS TO CAPTAINS WITH SECRET JEWISH ANCESTRY

OTTO KRETSCHMER

The deadliest submariner of the war

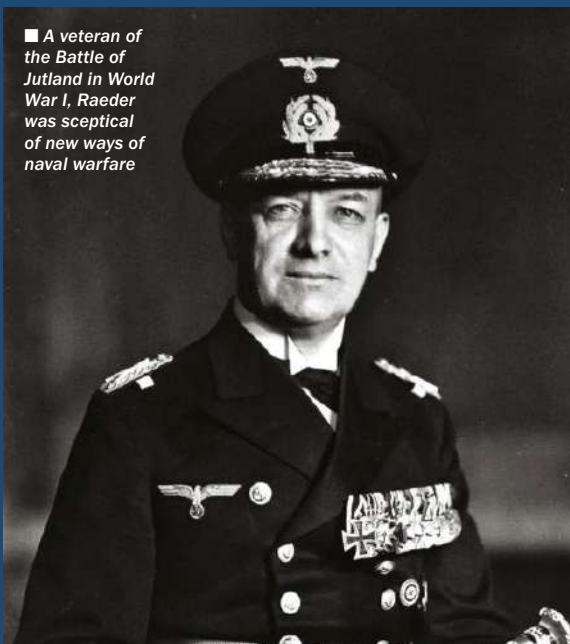
Years: 1912-1998 **Country:** Nazi Germany

Otto Kretschmer was one of the most highly skilled Kriegsmarine commanders in the Atlantic and a constant thorn in the side of the Allied navies. In the first 18 months of the war alone he sank 44 ships, equal to 266,000 tons of shipping. Prior to the war, Kretschmer had led an unremarkable career in the Weimar Republic's fledgling navy. At the start of the war the young submariner was in command of the U-23 in the North Sea. After sinking a number of Allied merchant vessels, he became one of the first commanders of the war to down a military ship as he sank the HMS Daring off the coast of Norway. He was transferred a few months later to U-99, a more capable Type VIIB submarine. Kretschmer and his crew tormented the Royal Navy's convoys under the cover of night and in one month at the tail end of 1940, he managed to sink 46,000 tons of Allied shipping. Kretschmer was a courageous captain who treated the crews of the ships he sank with dignity. There are even reports of him advising survivors in lifeboats to the nearest stretch of land. His unrivalled success came down to his tactic of firing just one fatal torpedo at a target. This way he saved up ammunition for further attacks on other ships before returning to shore. Dönitz praised Kretschmer for his innovative thinking, but the modest commander himself attributed his success to the two golden horseshoes that he placed on his conning tower to bring luck. On 17 March 1941 Kretschmer's streak was finally ended by HMS Walker, which damaged U-99 so badly it was scuttled. Sent to a POW camp in Canada, Kretschmer continued the war effort by keeping in contact with Naval High Command. He was returned to Germany after the war and was such an ardent submariner that he served in the Bundesmarine until 1970.



■ Kretschmer was nicknamed 'Silent Otto' by his colleagues due to his preference to maintain complete radio silence when on patrol

■ A veteran of the Battle of Jutland in World War I, Raeder was sceptical of new ways of naval warfare



ERICH RAEDER

Old-school commander of the Kriegsmarine

Years: 1876-1960 **Country:** Nazi Germany

The commander-in-Chief of the German Navy since 1928, Erich Raeder was the undisputed leader of the Kriegsmarine. The Hamburger had a long-held belief that the German navy should challenge the supremacy of the Royal Navy. Raeder was never interested in Nazi politics, but in the interwar period he directed the secret rejuvenation of the German fleet. During the war, he suggested and then directed the German invasion of Denmark and Norway, giving the Kriegsmarine essential extra ports in Scandinavia. Raeder's downfall came soon after, when he suggested that Hitler focus German resources on maritime operations in the Mediterranean rather than invade the USSR. This did not sit well with the Führer and further strategic differences led to his dismissal in 1943. He was replaced by Dönitz and sloped off into obscurity as the Third Reich crumbled. After the war he was sentenced to life imprisonment as a war criminal before being released in 1955 due to ill health.

"HE SUGGESTED AND THEN DIRECTED THE GERMAN INVASION OF DENMARK AND NORWAY"

GÜNTHER LÜTJENS

The skilled captain of the Bismarck

Years: 1889-1941 **Country:** Nazi Germany

Despite boasting Jewish heritage and a dislike of Nazism, Günther Lütjens ended the war as one of the Kriegsmarine's most decorated commanders. He played a leading role in the 1940 invasion of Norway and, having earned Raeder's trust, was promoted to admiral. His next success came in the Atlantic as aboard the battleships Scharnhorst and Gneisenau, he sank and captured 22 Allied vessels. After some respite at the German naval base in Brest in occupied France, in May 1941 Lütjens embarked on what would be his final mission. Commanding the battleship Bismarck, he battled Royal Navy battleships between Iceland and Greenland, sinking HMS Hood and defeating HMS Prince. Bismarck was later spotted by a British recon plane and, now completely outnumbered, was sunk by devastating salvos from renewed torpedo attacks; Lütjens and 2,106 members of the crew perished. Throughout the war, Lütjens refused the Nazi salute for a traditional navy gesture and decorated his ships with naval, not Nazi insignias.

“LÜTJENS REFUSED THE NAZI SALUTE FOR A TRADITIONAL NAVY GESTURE”



■ With his Jewish heritage, it is remarkable how far Lütjens rose in Nazi Germany's anti-Semitic state



■ Operation Cerberus was so secretive that even the ships' crews didn't know the exact route

OTTO CILIAX

An admiral famous for the Channel Dash

Years: 1891-1964 **Country:** Nazi Germany

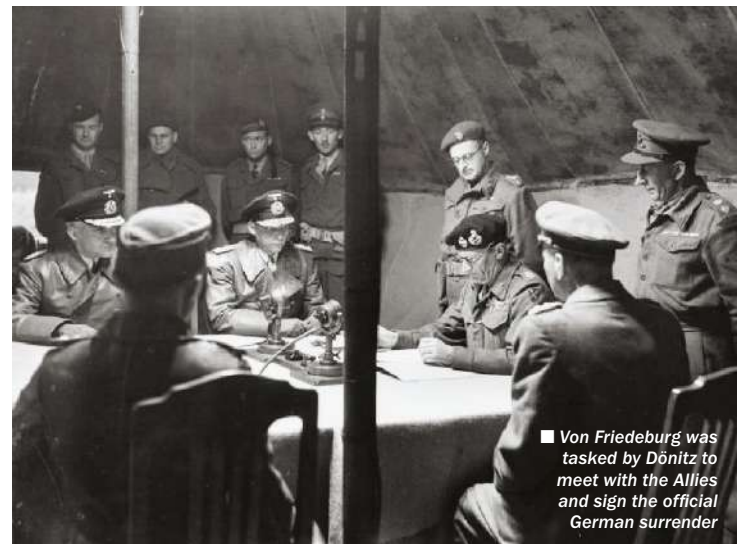
Otto Ciliac had been part of the Germany Navy since 1910. After serving on Scharnhorst, he was promoted to rear admiral and was put in command of all German battleships between 1941 and 1942. His most famous moment came in February 1942 when he led Operation Cerberus – or, as it is commonly known, the Channel Dash. Hitler, once again going against Raeder's advice, ordered battleships Scharnhorst and Gneisenau to make the risky journey from Brest to be deployed in German operations in Norway. The only route was through the English Channel, which was under constant surveillance by the Royal Navy. Departing on a moonless night, the convoy made its way through the Channel unscathed and to safety. It remains a humiliating episode for the Royal Navy, but a surprising success for the Germans. Ciliac was made commander of German naval forces in Norway for the remainder of the war, fighting back against escalating British commando attacks.

HANS-GEORG VON FRIEDEBURG

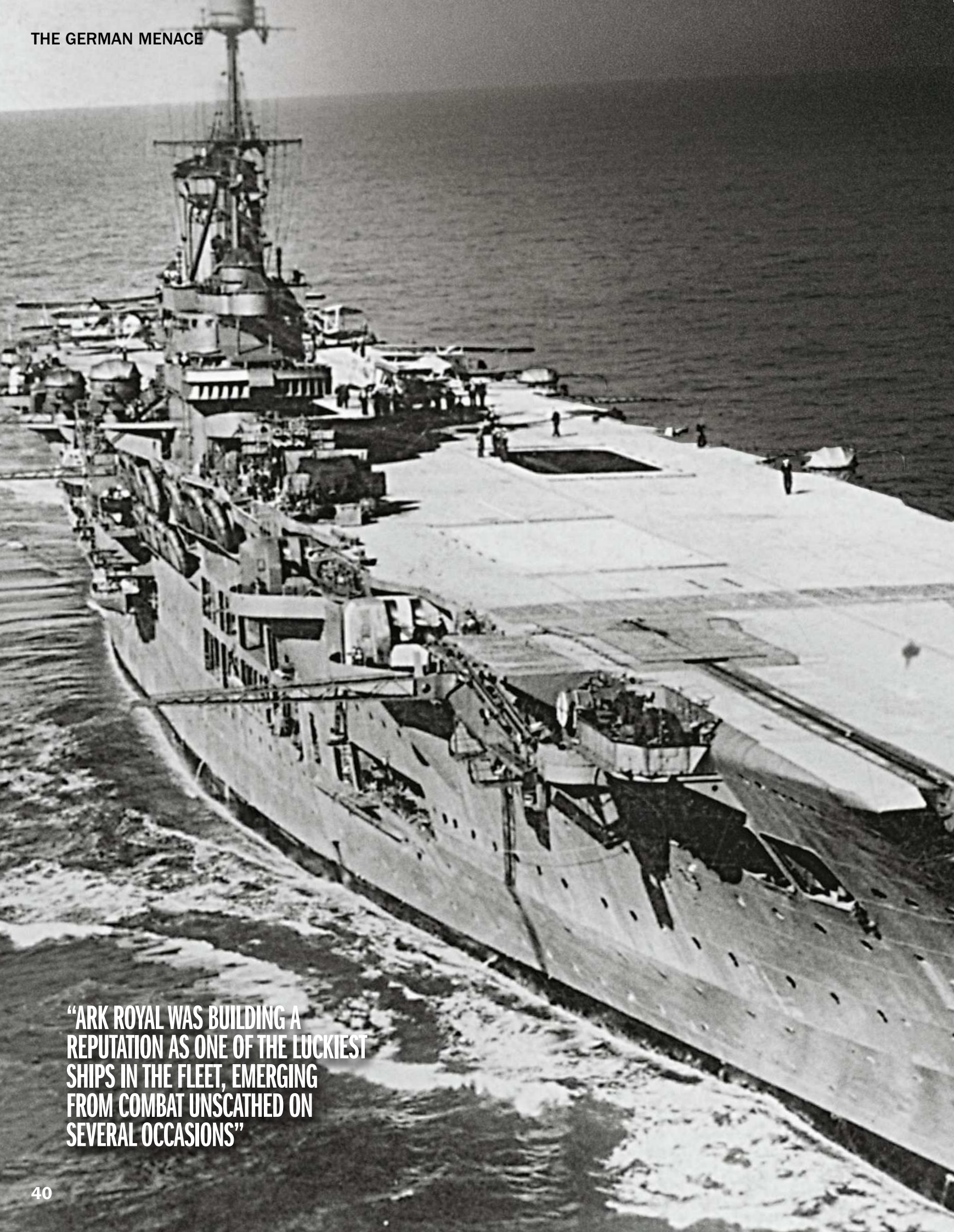
Dönitz's successor and peace negotiator

Years: 1895-1945 **Country:** Nazi Germany

Like Lütjens, von Friedeburg was of Jewish descent but unlike the Bismarck captain, he was very pro-Nazi. With Heinrich Himmler shielding his ancestry from other Nazis, von Friedeburg rose to deputy commander of the Reich's U-boat forces. He was tasked with maintaining Kriegsmarine bases in France and orchestrating submarine attacks on Allied convoys in the Atlantic. Von Friedeburg's status escalated towards the end of the war as he was made commander in chief of the Kriegsmarine after Dönitz succeeded Hitler as leader of Germany. With the Allies advancing on Berlin from both east and west, von Friedeburg's role as commander was curtailed before it could even begin. He later met with Field Marshal Montgomery to negotiate peace terms and sign surrender documents to end the war. After discovering that the Allies were planning on arresting him as a war criminal, he committed suicide on 23 May 1943 to avoid imprisonment.



■ Von Friedeburg was tasked by Dönitz to meet with the Allies and sign the official German surrender



**“ARK ROYAL WAS BUILDING A
REPUTATION AS ONE OF THE LUCKIEST
SHIPS IN THE FLEET, EMERGING
FROM COMBAT UNSCATHED ON
SEVERAL OCCASIONS”**

HMS ARK ROYAL

THE AIRCRAFT CARRIER HMS ARK ROYAL GAINED EVERLASTING FAME DURING A BRIEF BUT ACTIVE CAREER IN WORLD WAR II



he British Admiralty is operating the Ark Royal on paper, but the nasty Germans have meanwhile proven that the British Admiralty no longer operates this ship on the high seas," sneered Nazi radio commentator and propagandist Hans Fritzsche

on the evening of 16 October 1939. "It has vanished without a trace... It would be the third major British ship lost."

At the time of the erroneous broadcast, Ark Royal, one of the greatest warships in the illustrious history of the Royal Navy, was very much afloat. Although the Germans had already reported the redoubtable carrier sunk more than once, Ark Royal was building a reputation as one of the luckiest ships in the

fleet, emerging from combat unscathed on several occasions until that luck ran out in the autumn of 1941.

The best known of the Royal Navy's pre-World War II aircraft carriers, Ark Royal was the second carrier to bear the name, following a seaplane carrier launched in 1914 that served during World War I. The only ship constructed to its particular design, Ark Royal was first laid down 16 September 1935, and commissioned on 16 December 1938. Her construction incorporated a number of new design concepts, and she served as a platform for the development of carrier air operations and tactics.

When war came in September 1939, Admiral Sir Charles M Forbes, commander-in-chief of the Home Fleet, flashed a message to the navy. "War having been declared against Germany," he related, "I am confident that the conduct of every officer and man will ensure it

being brought to a speedy and successful end." For two years, Ark Royal was in the thick of the fighting. The 22,000-ton carrier participated in the hunt for the German pocket battleship Admiral Graf Spee; during anti-submarine operations off the Norwegian coast, she narrowly avoided two German torpedoes and a 2,200-pound bomb; and participated in the first sinking of an enemy U-boat during World War II. Its aircraft were credited with the war's first shootdown of a German plane.

Ark Royal delivered fighter aircraft to Malta and performed convoy escort duty during the effort to provision the embattled Mediterranean island. Its most memorable exploit came during the all-out effort to track and sink the German battleship Bismarck in the spring of 1941.

Although its wartime career was brief, Ark Royal and her valiant crew contributed significantly to the eventual Allied victory at sea in the European theatre.



■ British sailors look on as Ark Royal slowly sinks

DESIGN AND LAUNCH

The design and deployment experience of Ark Royal heavily influenced aircraft operations and the construction of subsequent Royal Navy carriers

The development of Ark Royal began 15 years before the aircraft carrier entered service with the Royal Navy in 1938. Designed in compliance with the Washington Naval Treaty of 1922, which limited the number and tonnage of capital ships among the world's largest naval powers – the United States, Great Britain, Japan, France, and Italy – Ark Royal is rightly considered a forerunner of the Illustrious-class carriers laid down during the late 1930s.

In 1923, the Admiralty embarked on a 10-year naval construction program; however, the economic downturn following World War I created a lengthy delay. Design work was completed in 1934, and Cammell Laird and Company laid down the keel of Ark Royal in September 1935 at Birkenhead on the banks of the River Mersey. The basic plan of Ark Royal did carry on with the later Illustrious-class carriers, and the tragic loss of Ark Royal in November 1941 prompted modifications to those carriers then under construction, particularly related to flood control, protection of internal spaces and auxiliary power. Ark Royal incorporated several landmark design features. It was the first carrier constructed with the hangar and flight decks as integral components of the hull rather than additions to the superstructure.

Although the development of the Fleet Air Arm was a cornerstone of the 1923 mandate, only one aircraft carrier was included in the budget for the expansion. Therefore, Sir Arthur Johns, the

Royal Navy's director of naval construction, faced the challenge of employing existing technology, including the steam catapult and arresting lines that facilitated the takeoff and landing of carrier-based aircraft, while also maximising space utilisation. He began the task in 1930, and Ark Royal took shape with two hangars, one above the other, along with three elevators. The carrier was originally intended to host a complement of 72 planes; however, space constraints reduced the number to 60 and eventually to 54 as the size and weight specifications of emerging aircraft types increased.

Ark Royal's flight deck was 243 metres long, considerably longer than those of Illustrious-class carriers, and extended 30 metres beyond the length of the ship's keel. The superstructure towered a mighty 20 metres above the waterline.

Powered by a combination of six Admiralty boilers and three Parsons turbines producing a top speed of 31 knots, HMS Ark Royal was launched on 13 April 1937. Its air group included up to six squadrons primarily flying the Fairey Swordfish torpedo bomber and the Blackburn Skua, a dual-purpose fighter/dive bomber.

Ark Royal's crew was piped aboard in 1938, and rather than deploying to the Far East as originally intended, the carrier was retained in European waters due to growing unrest on the continent. Following sea trials, Ark Royal was active in the development of carrier air operations protocols.



HMS ARK ROYAL

BUILDER: Cammell Laird

LAUNCHED: 13 April 1937

DISPLACEMENT: 22,000 tons (22,352 tonnes)

LENGTH: 243.8m (800ft) flight deck 243 m (797ft)

Beam 28.9m (94.75ft) Flight deck 29.26m (96ft)

DRAUGHT: 6.93m (22.75ft)

ENGINES: 3-shaft geared turbines 102,000 shp, 30.75 knots

ARMAMENT: 72 aircraft, 16 x 114mm (4.5inch)

48 x 2-pdr

CREW: 1,575

■ *Sinking of the Bismarck as seen from the German cruiser Prinz Eugen*

STALKING BISMARCK

A latecomer to the hunt for the German battleship, Ark Royal was instrumental in the destruction of the Nazi behemoth

The epic chase to sink the German battleship Bismarck in the spring of 1941 was well underway when Gibraltar-based Force H was ordered to join the pursuit. By the morning of 26 May, it appeared that Bismarck had the upper hand, steaming toward the French port of Brest, stretching for the protection of Luftwaffe aircraft support and a cordon of U-boats.

A fortuitous sighting by an Allied patrol craft fixed Bismarck's position. It was clear that one hope remained. The Fairey Swordfish torpedo planes

aboard the aircraft carrier Ark Royal, centrepiece of Force H, might attack and slow Bismarck, allowing the battleships King George V and Rodney, which were in hot pursuit, to close in and destroy their adversary. It was a long shot, for sure, but certainly worth the gamble.

Late on the afternoon of 26 May, a flight of 15 Swordfish climbed from Ark Royal's flight deck into the darkening sky. Flying toward Bismarck's anticipated position, several Swordfish mistakenly attacked the cruiser HMS Sheffield. The remainder

flew on, sighting the Nazi battleship as twilight descended. Withering anti-aircraft fire greeted the raiders, who gallantly pressed their attacks.

Two torpedoes struck home, with one dooming Bismarck. As gale-force winds whipped the surf just 15 metres below, Sub Lieutenant John Moffatt dropped his ordinance. The torpedo slammed into the ship's stern, jamming her rudders 15 degrees to port. The wounded giant was forced north-west toward the oncoming battleships. Ark Royal's airmen had sealed the fate of the mighty Bismarck.

ARK'S HUNTERS

Although Ark Royal's aircraft were rapidly becoming outdated, they were still instrumental

FAIREY SWORDFISH

By 1939, the Fairey Swordfish was a flying anachronism. In an era of high performance monoplanes, the biplane was constructed mostly of wire, wood, and canvas stretched across a metal airframe. Nicknamed the 'Stringbag', the Swordfish was a slow, lumbering aircraft, mustering a top speed of 230 kilometres per hour while armed with a single aerial torpedo. Although it could accommodate a crew of three, including pilot, observer and radio operator/rear gunner, the third position was often occupied by an auxiliary fuel tank. At the outbreak of World War II, 26 squadrons of the Fleet Air Arm were equipped with the antiquated Swordfish.

Despite its shortcomings, the Swordfish was a stable torpedo launching platform, and the aircraft proved its worth, delivering the decisive blow that crippled Bismarck in May 1941, leading directly to the sinking of the Nazi battleship.

The saga of the Swordfish remains one of the most enduring chapters of World War II. The aircraft ended up serving in all theatres of the conflict, and by the time production ultimately ceased in August 1944, nearly 2,400 had been built.

FAIREY SWORDFISH

BUILDER: Fairey Aviation
LENGTH: 11.07m (36ft)
SPAN: 13.86m (45ft)
WEIGHT: 2,359kg (5,200lb)
ENGINE: 1 x 690 or 750 hp Bristol Pegasus 224kmph (139mph)
CEILING: 3,261m (10,700ft)
ARMAMENT: 2 mg, 1 x 45.7cm (18inch) torpedo or 680kg (1,500lb) bombs. The Mk II could carry 8 x 27kg (60lb) rockets.
CREW: 3

■ No 820 Squadron Fairey Swordfish passing overhead Ark Royal, c. 1939



BLACKBURN SKUA

Introduced to the Fleet Air Arm in November 1938, the Blackburn Skua was a two-man, all-metal monoplane developed in the mid-1930s to perform the dual functions of carrier-based fighter and dive bomber. Armed with four forward-firing 7.7mm Browning machine guns and a rear-firing 7.7mm Vickers K machine gun, the Skua had a top speed of only 362 kilometres per hour, far below the performance of other contemporary fighter aircraft. In the dive bomber role, the Skua's payload included up to 227 kilograms of bombs.

Flying from the deck of the aircraft carrier Ark Royal early in World War II, the Skua was effective against German bombers but lost heavily in combat with the modern Messerschmitt Me 109 fighter. The Skua was credited with the first confirmed British aerial kill of World War II, downing a German Dornier Do 18 flying boat in September 1939, and Skua pilots sank the German cruiser Königsberg on 10 April 1940.

Only 192 Skuas were built, and the aircraft was withdrawn from frontline service in 1941. A number of Skuas continued in service through the end of the war as training aircraft.

BLACKBURN SKUA

BUILDER: Blackburn Aviation Co.
LENGTH: 10.82m (35ft)
SPAN: 14.09m (46ft) or 4.72m (15ft) folded
HEIGHT: 3.81m (12ft)
WEIGHT: 2,490kg (5,490lb)
ENGINE: 1 x 905 hp Bristol Perseus 362kmph (225mph)
CEILING: 6,157m (20,200ft)
ARMAMENT: 4x Browning mg, 1x Lewis mg, 1x 2,217kg (500lb) bomb
CREW: 2

■ Blackburn Skuas of No 800 Squadron line up on deck



LOSS OF A LEGEND

Damage from a single German torpedo sank the carrier off Gibraltar in November 1941, but who's really to blame?

The island of Malta in the Mediterranean was a British bastion of resistance, a thorn in the Axis enemy's side. To bolster Malta's air defences, on 12 November 1941, the aircraft carriers Ark Royal and Argus launched 37 Hawker Hurricanes destined for the island.

Their mission complete, Ark Royal and the other ships of Force H retired westward toward Gibraltar. German submarines were operating in the area, and all hands remained vigilant. Nevertheless, on the afternoon of the 13th a huge explosion sent a geyser skyward near the destroyer Legion. The German submarine U-205 had fired three torpedoes at Ark Royal; all missed, but one exploded prematurely. U-205 dashed off a report that was picked up by another submarine, U-81.

At 3pm, Kapitänleutnant Friedrich Guggenberger of U-81 sighted Force H and began manoeuvring into firing position. About a half hour later, he fired four torpedoes at the battleship Malaya. Ark Royal was preparing to land Fairey Swordfish aircraft that had been flying anti-submarine patrol.

Guggenberger's torpedoes missed Malaya, but one of them struck Ark Royal amidships on her starboard side, tearing a gaping hole 40 meters long and nine meters wide, as it detonated against the bilge keel. The starboard boiler room, oil tanks, and air spaces were immediately flooded, and the carrier developed a pronounced list.

Communications and electric power were lost. Four men in the lower steering position, main switchboard, and telephone exchange below the waterline were plunged into darkness as seawater rushed in. Three reached safety, but Able Seaman Edward Mitchell perished, the only casualty among the ship's complement of around 1,600.

Legion came alongside, removing 1,487 crewmen. Some stayed aboard in a futile attempt to save Ark Royal. That evening, two tugboats took the carrier in tow. However, Ark Royal's list steadily worsened. Early on November 14, the carrier stood vertical on its stern for just three minutes and then slowly slid beneath the waves.

Captain Loben Maund, Ark Royal's commanding officer, faced court martial and was convicted of negligence; however, several design flaws contributed to loss of the carrier. Most notable was the absence of secondary power, such as diesel

generators. Without electricity, pumps, lighting and other equipment were disabled. Uncontrollable flooding doomed the ship.

In 2002, the watery grave of Ark Royal was discovered 1,000 meters deep, about 30 nautical miles off Gibraltar. The wreckage lies in two pieces amid a substantial debris field.

■ Right: Friedrich Guggenberger, Commander of U-81



■ Below: Ark Royal listing after being torpedoed on 13 November 1941 by U-81



ROYAL NAVY HEROES

MEET THE COMMANDERS LEADING THE CHARGE TO DEFEND THE BRITISH ISLES FROM ENCIRCLEMENT AND STARVATION

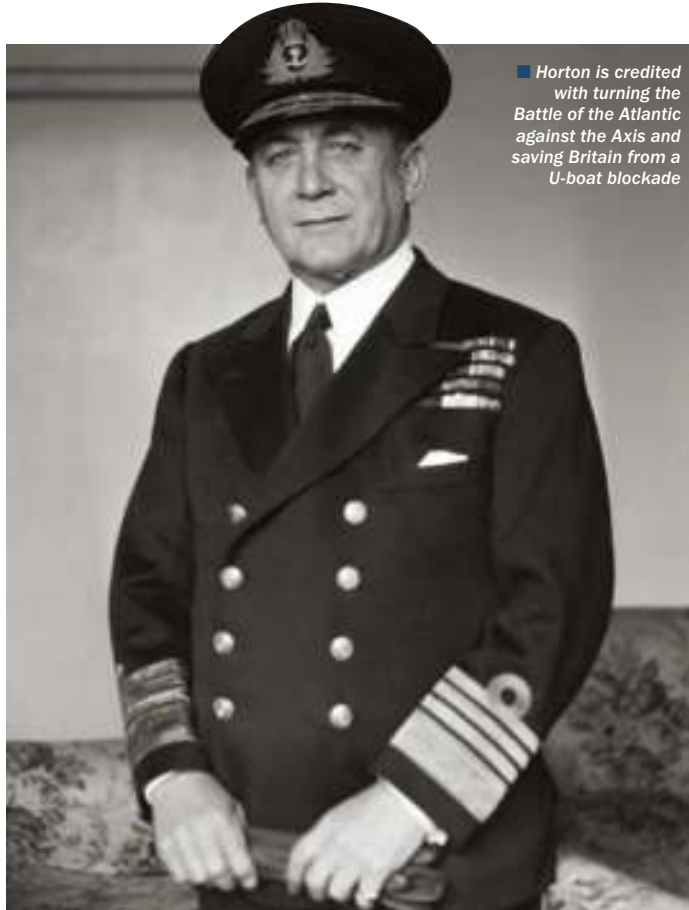
SIR MAX K HORTON

The premier Allied commander of the Atlantic

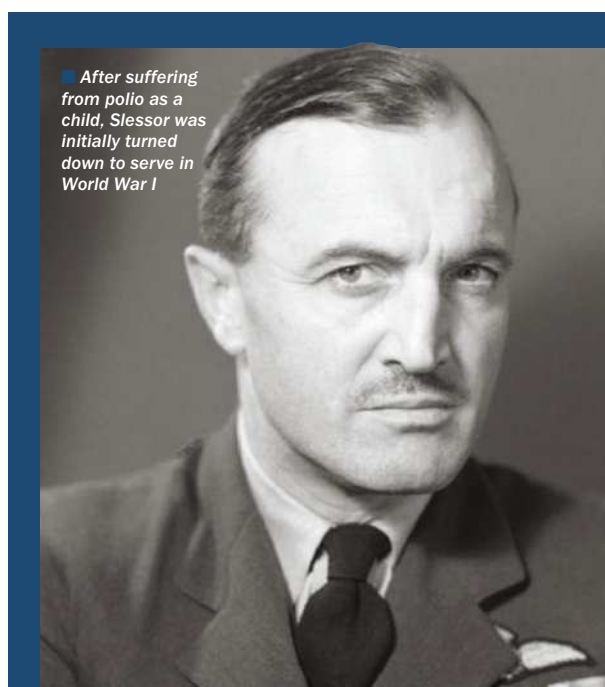
Years: 1883-1951 Country: Britain

A veteran of World War I, Max Horton began the war with a wealth of experience. During WWI he had served as a submarine captain and had been the scourge of many German cruisers. Promoted to commander-in-chief of Western Approaches in 1942, Churchill had put his faith in Horton when the Kriegsmarine firmly held the upper hand in the Atlantic. It was a masterstroke as he managed to withstand the menace of the German U-boats and keep Allied shipping lanes open before taking the battle back to the enemy. Horton is remembered as an efficient organiser and leader who utilised the Royal Navy's resources in the Atlantic superbly. He trained his crews hard and led with gritty determination and an unwavering spirit. The commander-in-chief only expected the very best from his men and could be quite ruthless in his command, only lavishing praise when he felt necessary.

Sir Max's combination of sea and air power was vital as small and close escorts were complemented with long-range RAF support. Horton benefited from the breaking of the Enigma code as well as an improvement in radar technology. He used these developments to his advantage as he used attack as the best form of defence. His navy soon became a formidable adversary to the U-boats as he outmanoeuvred Dönitz on the Atlantic battlefield. He was instrumental in both maintaining Britain's military and supply links with the USA, as well as devising an effective retort to the U-boats which had previously terrorised the Royal Navy. Horton's relentless aggression against the Kriegsmarine has seen him likened to other great British leaders such as Field Marshal Montgomery and Bomber Harris as the architects of the Allied victory in Europe. His achievements were so revered that he was honoured in France, the Netherlands, the USSR and the USA, as well as in Britain.



■ Horton is credited with turning the Battle of the Atlantic against the Axis and saving Britain from a U-boat blockade



■ After suffering from polio as a child, Slessor was initially turned down to serve in World War I

SIR JOHN SLESSOR

The aerial destroyer of wolf packs

Years: 1897-1979 Country: Britain

Sir John Slessor was a talented member of the RAF and Bomber Command who unleashed hell on the Kriegsmarine from the skies above. Although not a member of the Royal Navy, Slessor was just as vital as any admiral to the destruction of the wolf packs. As commander-in-chief of Coastal Command he supported the navy with distinction as both air and sea combined to destroy the Kriegsmarine. Along with Horton, Slessor helped stabilise the Battle of the Atlantic in the Allies' favour. Out of the 60 squadrons he organised, 34 were sent into combat against the U-boats. This addition of 430 aircraft helped support the Royal Navy convoys despite there being very few long-range Liberator aircraft at his disposal. During his two years of service in the Atlantic, British aircraft sank an average of seven U-boats a month. He was rewarded with the role of commander-in-chief of the RAF in the Mediterranean and the Middle East, and was renowned for his administrative and motivational skills.

“OUT OF THE 60 SQUADRONS HE ORGANISED, 34 WERE SENT INTO COMBAT AGAINST THE U-BOATS”

SIR DUDLEY POUND

A wily yet divisive admiral

Years: 1877-1943 **Country:** Britain

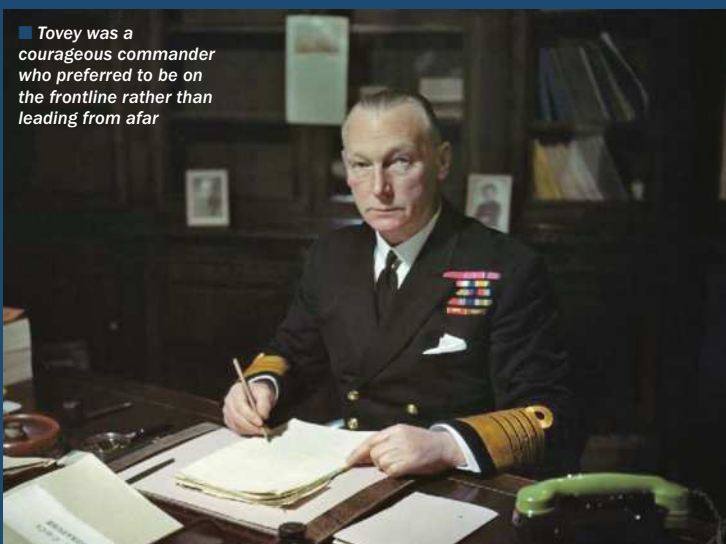
A Jutland veteran, Pound held the title of first sea lord and then admiral of the fleet in the early years of the war. Although not as dynamic or strategically intelligent as other naval commanders, he was a hard worker who was known for having great attention to detail. He soldiered on despite his advancing age, as well as a brain tumour that he never informed the admiralty about. Pound made errors of judgement in his leadership but is credited with realising earlier than anyone else that to win the Battle of the Atlantic, the U-boat threat had to be defeated at all costs. He successfully managed to convince Churchill and many other commanders that this was where the battle at sea would be won or lost. He died of a stroke on Trafalgar Day in 1943 and was replaced as first sea lord by Andrew Cunningham, who went on to lead British forces with distinction in the Mediterranean.

“HE SOLDIERED ON DESPITE HIS ADVANCING AGE, AS WELL AS A BRAIN TUMOUR”



■ Due to injuries, Pound was a poor sleeper and was known for dozing off at meetings

■ Tovey was a courageous commander who preferred to be on the frontline rather than leading from afar



SIR JOHN TOVEY

The destroyer of the Bismarck

Years: 1885-1971 **Country:** Britain

After success against the Italians in the Mediterranean, Sir John Tovey's talents were required for the Atlantic theatre of war. He was transferred to the Home Fleet in the final few months of 1940 and given the rank of commander-in-chief. Tovey believed that admirals were meant to be on the bridge of a flagship, and he led from the front. Rather than working behind the lines in an onshore headquarters, he preferred to be safe in the knowledge that he was experiencing the same conditions as his men; a trait that would rub off on his staff. Sir John is best known as the brains behind the sinking of the Bismarck. Doggedly pursuing the iconic German battleship, it was sunk on the 27 May 1941. This act prevented the Bismarck from joining two other German battleships, the Scharnhorst and the Gneisenau. If they had combined forces, they would have been a major threat to the Royal Navy.

SIR PERCY NOBLE

A vital early commander

Years: 1880-1955 **Country:** Britain

Unlike Tovey, Noble was a commander who preferred sitting behind a desk in an office rather than standing on the bridge of a destroyer. This is no slight on his achievements, though, and it was Noble who organised the Western Approaches perfectly for Horton to later fill the void. Leading the navy from his headquarters in Liverpool, Noble organised escort groups in the early stages of the war and installed training methods that are now seen as key to the subsequent strategy used against the Kriegsmarine. He was renowned for being calm and calculated, adept at getting his colleagues round to his way of thinking. Noble was a laid-back commander whose methods were the opposite of the driven Horton. It was Horton who replaced Noble as commander-in-chief of the Western Approaches and he built upon the foundations laid down by his predecessor. Noble provided brains and Horton provided the bite.



■ Noble was described as being relaxed and easy to work with by his officers



THE ALLIES STRIKE BACK

INNOVATIVE TACTICS AND
TECHNOLOGICAL BREAKTHROUGHS
HELPED TURN THE TIDE



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The convoy system was vital to Allied success

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With Europe on its knees, Britain's only hope lay in the hands of its Merchant Navy

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The tech that bested Dönitz's wolf packs

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Welcome to the worst journey in the world

74 THE TIDE TURNS

1941 saw a gradual reversal of German fortunes

78 ALLIED COMMANDERS

Meet the men tasked with assisting the Royal Navy in stemming the tide of the U-boat peril

80 HMS BELFAST

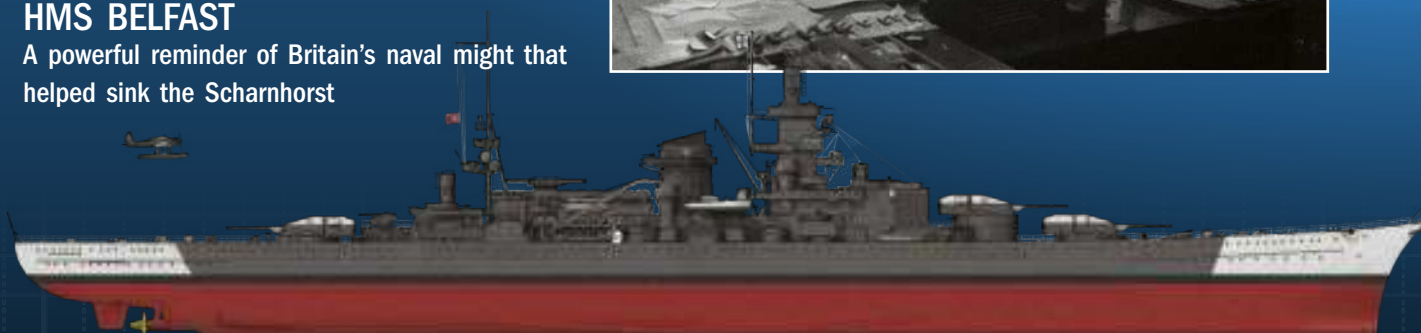
A powerful reminder of Britain's naval might that helped sink the Scharnhorst

86 CANADA'S RACE ACROSS THE SEAS

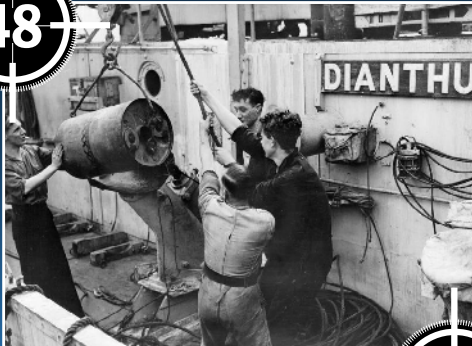
Throughout World War II, Canada fought tirelessly at Britain's side in the fight for the Atlantic

90 CRACKING ENIGMA

Discover how the men and women of Bletchley Park deciphered the 'unbreakable' German Enigma



48



80



64



78



58



■ An Allied convoy moves eastward across the Atlantic, bound towards Casablanca in North Africa, in November 1942

ANATOMY OF A CONVOY

THE CONVOY SYSTEM, BORN OUT OF THE CRUCIBLE OF THE FIRST WORLD WAR, WAS VITAL TO ALLIED SUCCESS IN THE ATLANTIC CONFLICT



In the spring of 1917, Great Britain's fortunes in the First World War looked bleak. The admiralty had responded lethargically to the threat of German U-boats, prompting the secretary of state for war to concede that the Royal Navy had lost command of the sea. The number of U-boats on patrol had rocketed from fewer than 30 at the outbreak of hostilities to more than 70 and it is said that during April of that year, a quarter of ships that sailed from British ports did not return. By the autumn, U-boats had accounted for 8 million tons of shipping.

Allied ships, sailing individually, were in grave peril. A U-boat captain lying in wait on a well-worn trade route could easily pick off an unprotected vessel. And for all its maritime prestige, the Royal Navy could not afford to provide escorts to each and every trade vessel. Even if a U-boat failed to spot a ship, it would

not be long before another steamed into view. The probability factor alone ensured a decent success rate. The U-boats wreaked havoc.

The answer to the U-boat menace was the convoy system, and it is remarkable to think that the admiralty ignored it for so long. After all, the principles had been established when Nelson was master of the sea. If merchant ships sailed together in a fleet, a close naval escort could sail alongside them, providing an active deterrent to any marauding enemies. In addition, if a U-boat captain failed to catch sight of a convoy, he would have to wait a long time for another to hove into view. A dozen ships scattered individually across the Atlantic provided a dozen targets; a convoy with a dozen ships sailing in close order offered only one.

This system did much to swing the battle for the Atlantic in the Allies' favour in WWI and the admiralty owed much to the USA for its introduction. America entered the war during April 1917 following the sinking of

seven unarmed US merchant ships, President Woodrow Wilson declaring a "war to end all wars." And America's intervention was the Kaiser's undoing. Forty US warships took to the sea to boost convoy protection.

It should come as no surprise then that Winston Churchill, in his position as first lord of the admiralty, should instigate the convoy system early in the passage of the Second World War. He had learnt the lessons from the previous conflict. What he could not predict, however, was the cunning of the German Kriegsmarine, especially Karl Dönitz who crafted the wolf pack tactics by which several submarines were strung out in a chain on the surface, covering a wide band of ocean. It took just a single captain to spot an approaching convoy, prompting the entire pack to move swiftly in to attack and overwhelm the escorts. Once Germany took possession of the French west coast ocean ports, the wolf packs enjoyed enormous success, ensuring the Battle of the

“THE CONVOY SYSTEM WAS BETTER THAN NO SYSTEM AT ALL. ITS SUPPORTERS WOULD POINT TO THE FACT THAT WHILE MORE THAN 300 MERCHANT SHIPS HAD BEEN SUNK DURING 1941, TWO-THIRDS HAD BEEN SAILING OUT OF CONVOY”

Atlantic was fought on a knife edge. It might have gone either way.

The convoy system offered at least partial protection against the wolf packs. The primary issue was the shortage of escorts. The Royal Navy of 1939 was but a shadow of the fleet that sailed during WWI and of its three battlecruisers, two had been built during the last war. Only one of its six aircraft carriers was purpose-built – the other five were conversions from the 1920s. Crucially, there was a huge shortage of smaller ships needed for escort duty. Indeed, in the early days of the war only two or three destroyers and a corvette were available to escort a convoy of up to 50 ships across 3,000 miles of ocean. And these vessels were not a major concern to a battle-hardened wolf pack. In addition, the depth charges used against U-boats were deployed via guesswork and would not breach a hull unless they exploded nearby.

And yet the convoy system was better than no system at all. Its supporters would point to the fact that while more than 300 merchant ships had been sunk during 1941, two-thirds had been sailing out of convoy. In addition, the Kriegsmarine had lost 28 U-boats during the same period, suggesting that the escorts had

been doing their job. Certainly, Dönitz drew similar conclusions and when the United States entered the war, he transferred his focus to the US eastern seaboard. Surprisingly, given their support of the system in WWI, the Americans were slow to adopt the convoy system when sailing their own waters and Dönitz's 12 U-boats operating off US shores sank 1.25 million tons between January and March 1942.

By May 1942, however, the US adopted the convoy system and losses decreased significantly. U-boats still inflicted heavy damage during 1942-43, but the tide began to turn. Radio interceptions turned to the Allies' advantage, allowing more plentiful convoy re-routing. American production increased, with escorts becoming more plentiful; by April 1943 there were five permanent escort groups. Centimetric radar also boosted the Allies' performance by enabling the detection of smaller objects. And, perhaps most importantly, the introduction of long-range aircraft like the Liberator forced the U-boats to travel submerged, reducing their speed fourfold, thereby breaking the dominance of the wolf packs. By May 1943, conceded Dönitz when writing his memoirs later, “We had lost the Battle of the Atlantic.”



ALLIED CONVOYS IN NUMBERS

BREAKING DOWN THE SYSTEM'S SUCCESS

3,000

The number of ships in the British merchant fleet at the outbreak of war.

12

The number of Royal Navy battleships in service at the outbreak of war.

12-15 DEGREES WEST

The point at which Royal Navy escorts left their outbound convoys in the early days of the war and waited for returning convoys to escort into the Western Approaches.

9-15 KNOTS

The speed of ships permitted to sail in ocean convoy. The rest were left to fend for themselves.

20

Area of sea in square miles that might house a typical 40-50 ship convoy.

59 MILLION

The tonnage of Britain's food and raw material import requirements.

114

Total number of ships sunk in Atlantic waters during 1939.

Only 12, however, were sunk while in convoy.

22

Number of merchant vessels sunk from the 90-ship total comprising the convoys HX229 and SC122. The tonnage lost totalled over 145,000, making this the biggest German success in any single engagement with a convoy.

105

Number of convoys successfully rerouted between July 1942 and May 1943.

THE CONVOYS' NAVAL MUSCLE

FACING A SHORTAGE OF SUITABLE ESCORT VESSELS, THE ROYAL NAVY DEVELOPED OR EMPLOYED A NUMBER OF WARSHIP CLASSES AND TYPES IN ITS BID TO PROVIDE CONVOY SUPPORT

RIVER-CLASS FRIGATE

The Atlantic convoys prompted the introduction of the River-class frigates, which were designed specifically as anti-submarine escorts. The frigates were built for speed and endurance in North Atlantic waters, their twin engines extending the ships' range to nearly double that of a corvette at 7,200 nautical miles. They could travel at up to 20 knots and were armed with the most effective anti-submarine sensors and weapons available at the time, the majority boasting a twin 4-inch mount forward and 12-pounder aft. After 1942, many were fitted with a Hedgehog anti-submarine mortar. The likes of HMS Rother and HMS Spey were launched in late 1941. They served primarily in the Royal Navy and Royal Canadian Navy, though they earned the tag of 'Commonwealth' ships due to the large numbers operated by Australia, South Africa and also the Free French, Dutch and even the USA. A total of 151 River-class ships were built between 1941 and 1944, with around 65 serving in the Royal Navy.



■ A depth charge is loaded on board the Flower-class corvette HMS Dianthus

FLOWER-CLASS CORVETTE

They may have boasted whimsical names (HMS Bluebell, HMS Crocus etc), but the Flower-class corvette was widely regarded as the ugly duckling of the Atlantic fleet. In the run-up to the war, the Royal Navy was acutely aware of its deficiency in small, relatively inexpensive warships that could be pressed into service as Atlantic escorts. The admiralty turned to the Smiths Dock Company, a specialist in the construction of fishing vessels, which suggested a design based on the whale catcher Southern Pride. Quick and easy to produce, over 260 entered into service and their long-range capabilities saw them become the mainstay of Mid-Ocean Escort Force convoy protection during the first half of the war. They were cramped and damp and they rolled around the waves rather than slicing through them, but they coped readily with Atlantic conditions. Flower-class vessels had a maximum speed of 16 knots and were lightly armed for anti-submarine warfare.

CAPTAIN-CLASS FRIGATE

The Royal Navy's 78 Captain-class frigates were constructed in the USA and launched over 1942–1943 under the provisions of the Lend-Lease agreement. They were drawn from two sub-classes of the American destroyer escort classification: 32 from the Evarts subclass and 46 from the Buckley subclass, though the Royal Navy classified them as frigates, as they lacked the torpedo tubes that would promote them to British destroyer classification. They served as convoy escorts and anti-submarine specialists, taking more U-boat scalps than any other class of ship. In total they sank more than 30 German submarines during the course of the war. They were produced quickly at great economy – HMS Halsted was built in less than four weeks – taking to the water for half the cost of a fleet destroyer. U-boats torpedoed at least 11 of the 78 Captain-class frigates.

“CAPTAIN-CLASS FRIGATES TOOK MORE U-BOAT SCALPS THAN ANY OTHER CLASS OF SHIP”



■ HMS Dacres, a Captain-class frigate, built in the United States as an Evarts-class destroyer escort, before its transferral to the Royal Navy

ALLIED EYES IN THE SKY

AIRCRAFT WERE CRUCIAL IN CLOSING THE ATLANTIC GAP

The greatest threat to the German U-boat came from the skies. Admiral Karl Dönitz was only too aware of the damage aircraft could inflict on his fleet. Once threatened from the air, the U-boats' efficacy wilted. Fully submerged, the average U-boat could only achieve around 7 knots, which was often less than the speed of its quarry. The burgeoning numbers of British Coastal Command's short and medium-range bombers had already forced Dönitz's wolf packs deeper into Atlantic waters. Hence, by late 1942 the U-boats were forced to operate primarily in the so-called Atlantic Gap, out of range of such aircraft, though here they hunted with near impunity.

The only aircraft capable of escorting a convoy on the entirety of its route was the American B-24 Liberator Mk1, which could fly 2,700 miles. The US delivered the first of these machines to the RAF in September 1941, though perpetual wrangling between Coastal Command and Bomber Command resulted in the former taking delivery of only nine of those aircraft. Indeed, Dönitz benefited

greatly from the stubbornness of the Bomber Command which insisted that RAF bombers should continue striking at Germany's industrial heartland rather than shepherd convoys across the ocean. This defensive play was regarded as secondary and rather ungallant. Bomber Command's intransigence would cost the Allies thousands of tons of shipping.

During 1942, the Atlantic Gap closed slightly as America moved from aggressive neutral to committed war ally and its famous B-17 Flying Fortress could offer convoy air cover up to 800 miles from land, Allies flying their bombers from bases in Greenland, Iceland and Northern Ireland, as well as from the US and Canadian east coast. But Bomber Command's obstinacy over the Liberator meant that by January 1943 Coastal Command had but one squadron of Very Long Range (VLR) bombers, nowhere near enough to manage the U-boat threat in the Atlantic Gap.

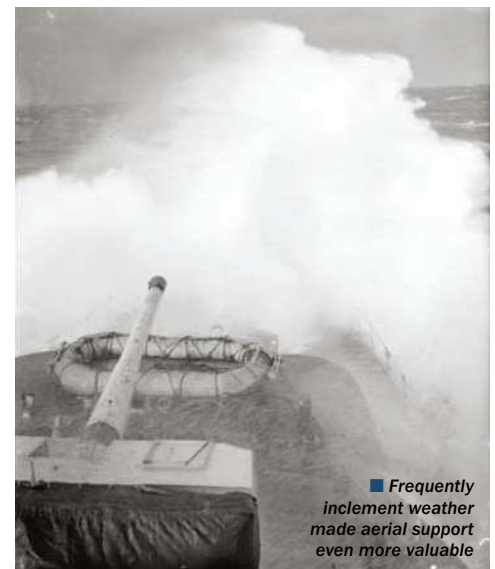
The breakthrough came in the spring of that year. The formation of the Anti U-boat Warfare Committee in November 1942 put

increasing pressure on Bomber Command and pledged to grant a further 39 VLR Liberators to Coastal Command by March 1943. The Casablanca Conference, held in January 1943, agreed that the Battle of the Atlantic should receive maximum attention and resources from the united nations and, slowly but surely, the VLRs began to arrive where they were needed most. Many were now fitted with 10cm radar. The chief of Coastal Command, Air-Vice Marshal John Slessor, claimed that their arrival had 'an instantaneous and dramatic effect' on the safety of Allied convoys.

In addition, by May of 1943 the Allies had also been able to relocate a clutch of aircraft carriers from Mediterranean waters and the Far East, thereby granting the convoys full-time air support from short-range bombers. This was pivotal. At last the convoys had sufficient protection from the skies and the Atlantic Gap closed. The Battle of the Atlantic had reached its turning point. For Dönitz and his U-boat fleet, the writing was on the wall.

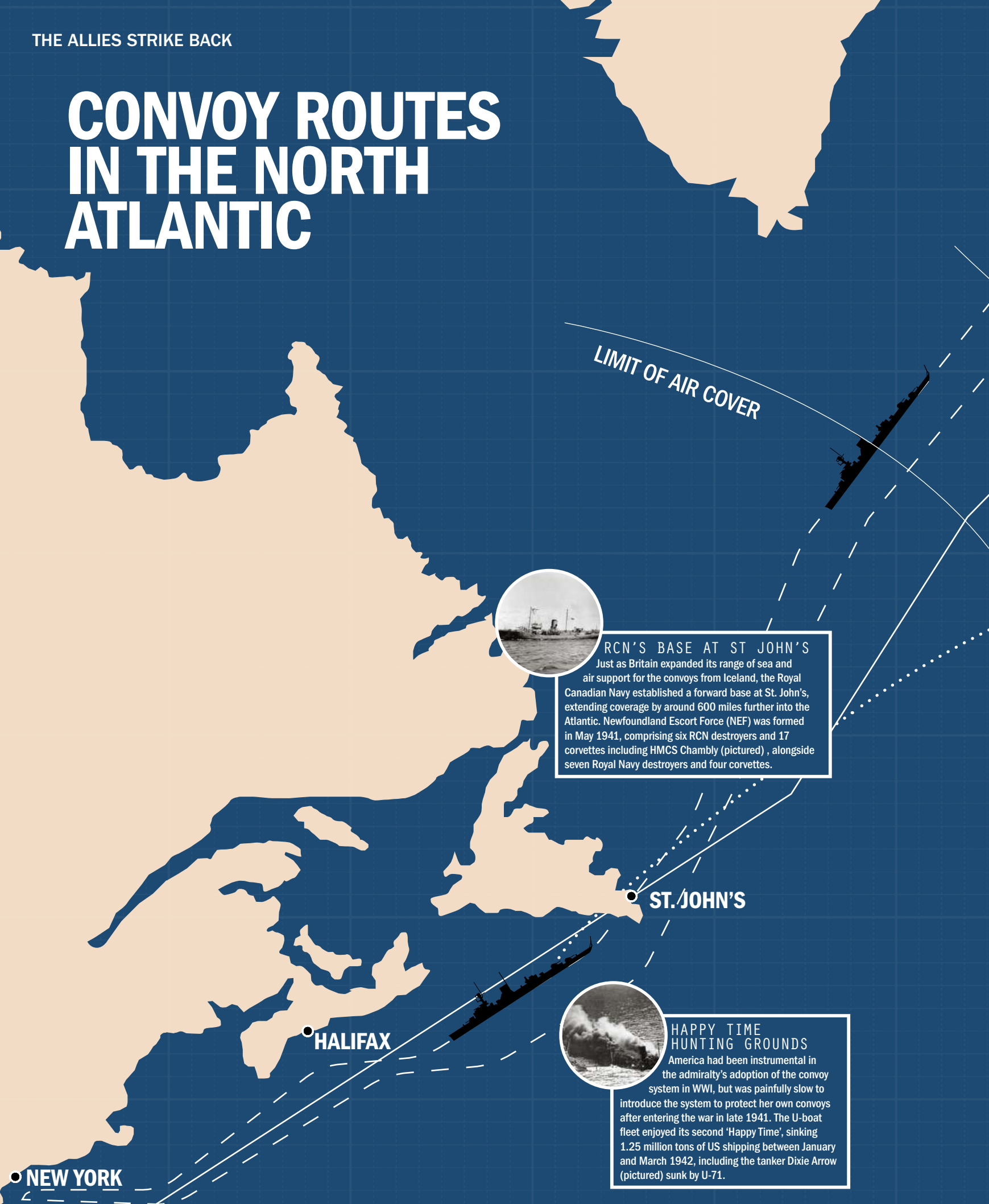


■ Aircraft also provided some of the best imagery of Allied convoys in action



■ Frequently inclement weather made aerial support even more valuable

CONVOY ROUTES IN THE NORTH ATLANTIC



LIMIT OF AIR COVER



RCN'S BASE AT ST JOHN'S

Just as Britain expanded its range of sea and air support for the convoys from Iceland, the Royal Canadian Navy established a forward base at St. John's, extending coverage by around 600 miles further into the Atlantic. Newfoundland Escort Force (NEF) was formed in May 1941, comprising six RCN destroyers and 17 corvettes including HMCS Chambly (pictured), alongside seven Royal Navy destroyers and four corvettes.

ST. JOHN'S

HALIFAX

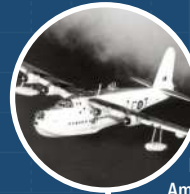
NEW YORK



HAPPY TIME HUNTING GROUNDS

America had been instrumental in the admiralty's adoption of the convoy system in WWI, but was painfully slow to introduce the system to protect her own convoys after entering the war in late 1941. The U-boat fleet enjoyed its second 'Happy Time', sinking 1.25 million tons of US shipping between January and March 1942, including the tanker Dixie Arrow (pictured) sunk by U-71.

ICELAND SECTION SC.122



APPROXIMATE AIR COVER BOUNDARIES

Before the widespread use of the American very long range Liberator Mk1 bombers, which could fly the full width of the Atlantic, convoy air support was limited to these boundaries flown by short- to mid-range bombers such as the Sunderland (pictured). In the eastern Atlantic, RAF bombers would fly from Northern Ireland and Iceland. The USAF would also establish air bases in Greenland to further extend the air support boundary.

LIMIT OF AIR COVER

DIRECT OR GREAT CIRCLE ROUTE

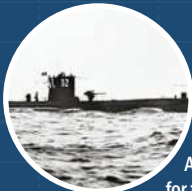


WESTERN APPROACHES

The lack of escorts meant that early in the war the convoys were escorted only to the limit of the Western Approaches before being left to fend for themselves. Here the escort ships waited for incoming convoys to shepherd back to Britain. The Western Approaches were a key battleground, falling under the remit of the commander-in-chief, Western Approaches, such as Admiral Percy Noble.

LIVERPOOL

LIMIT OF AIR COVER



THE AIR GAP

As short- to mid-range bomber cover for the convoys became more prevalent, the U-boats moved further into the mid-Atlantic waters where the likes of U-52 (pictured) could operate with impunity. U-boats were highly susceptible to attack from above and it was the introduction of more very long range bombers, and the deployment of extra aircraft carriers, that helped tip the scales in the Allies' favour.

CONVOY PLANNED ROUTE NEW YORK TO LIVERPOOL

SC.122	—————	3,220 MILES
LOCAL CONVOYS	3,340 MILES
HX 229A	— — —	3,490 MILES



BRITAIN'S MERCHANT SAVIOURS

WITH EUROPE ON ITS KNEES AND GERMAN U-BOATS
ROAMING THE ATLANTIC, BRITAIN'S ONLY HOPE
LAY IN THE HANDS OF ITS MERCHANT NAVY



The Battle of the Atlantic raged from 3 September 1939 (the day Britain declared war on Nazi Germany) and did not reach its conclusion until victory in Europe was secured on 8 May 1945. Not only was it the longest engagement of WWII, it was arguably the most important.

Had the Axis powers (predominately comprised of the German Kriegsmarine) triumphed, Britain would have been cut off from

the supplies that sustained it and strangled into submission. It is in large part thanks to its vast merchant navy that Britain avoided catastrophe and maintained its war effort.

Before the outbreak of hostilities, Britain possessed the world's largest merchant navy, accounting for 33 per cent of global shipping tonnage and employing approximately 200,000 men and women. Its title was bestowed by King George V in honour of the merchant navy's critical role in victory in WWI. Prior to that conflict it had been known as the merchant

service or the mercantile marine. But it wasn't just an asset in times of war.

As an island nation, Britain was heavily dependent on the imports to its shores, as well as the revenue raised by exports that it sold around the world. In the lead-up to WWII Britain imported 70 per cent of its food, which required a colossal 20 million tons of shipping a year. Around half of the country's meat was imported; 70 per cent of its cheese and sugar; 80 per cent of its fruit; and 70 per cent of the cereal and fats that its population consumed.



■ Without the soldiers transported to Britain by the merchant navy, D-Day wouldn't have happened

“BEFORE THE OUTBREAK OF HOSTILITIES BRITAIN POSSESSED THE WORLD’S LARGEST MERCHANT NAVY, ACCOUNTING FOR 33 PER CENT OF GLOBAL SHIPPING TONNAGE”

Such reliance on overseas food placed Britain in a highly precarious position. While lessons had been learnt from WWI, Germany and its allies pinpointed the merchant navy as a vital target. Britain could be starved if its shipping could be sunk.

Another reason to attack Britain's merchant ships were the non-edible materials they transported. Without the oil, raw materials, weaponry and soldiers aboard, Britain would be completely unable to conduct a war. The scene was therefore set for a brutal life and death

struggle that would determine the war. It would end with 14.7 million tons of Allied shipping at the bottom of the sea and over 30,000 men and women of the merchant navy going down with it – a death rate proportionately higher than any of Britain's armed forces.

The seeds of what would eventually become the merchant navy were sown in the 17th century as the British Empire rapidly expanded. Benefiting hugely from trade with British possessions in India and the Far East, merchant shipping exploded. Transporting

THE ALLIES STRIKE BACK

lucrative goods such as sugar, tea and spices, not to mention illegal substances including opium, was an attractive prospect. Piracy also proved too enticing to resist for some sailors, with many foreign vessels falling victim to robbery.

The British government decided to take action, but did not meet with much success at first. Initial efforts to register seafarers as a source of labour for the Royal Navy in wartime failed, and were not fully implemented until 1835. By this time the merchant navy had cemented itself as a dominant global force. It would prove to be a position of great importance during WWI, and even more so in WWII.

VOLUNTEERS

From the outbreak of the war against Nazi Germany, individual seamen could decide whether they wanted to serve in the merchant navy, and thereby face the constant threat posed by German U-boats and battleships such as the Bismarck, or transfer to another branch of the military. Fortunately for Britain, thousands of courageous souls chose to remain at sea and run the gauntlet. But they weren't all British.

Many of those who served came from Commonwealth nations such as India, Canada and Australia. Chinese and African nationals also played a big part and, bizarrely, so did a handful of German and Japanese seamen. This truly international fleet did not always set sail in British boats either. Countries including Greece, Free France, the Netherlands and even 'neutral' Sweden leased their vessels to the British. But of the European states, none did more to aid Britain than Norway. As we shall see, this small Scandinavian country proved to be an invaluable ally in the bloody struggle that was to come.

On the very first day of the Battle of the Atlantic, within hours of Britain's declaration of war, Germany's U-boats scored a hit. The SS Athenia, under the command of Captain James Cook, had departed from Liverpool on



■ Warships and aircraft formed the escorts needed to protect merchant shipping

■ Admiral Erich Raeder led the German navy during the first half of WWII, resigning in 1943

“NONE DID MORE TO AID BRITAIN THAN NORWAY... THIS SMALL SCANDINAVIAN COUNTRY PROVED TO BE AN INVALUABLE ALLY IN THE BLOODY STRUGGLE THAT WAS TO COME”

2 September bound for Montreal. But Cook's ship would never reach its intended destination.

U-30 tracked the Athenia for three hours before firing two torpedoes, one of which crashed into its target's engine room and exploded. The stricken ship remained afloat for around 14 hours before succumbing to the waves, taking 128 lives with it, including women and children. It was Britain's first naval

loss of the war and a horrifying portent of things to come.

As it had done in WWI, Germany adopted a policy of unrestricted submarine warfare in its ferocious attempts to sever Britain's Atlantic lifeline. In what became known (in Germany) as 'The First Happy Time', Admiral Erich Raeder's fleet enjoyed huge success at sea. After the fall of France in 1940, Germany

CRACKING THE CODES

The work of Bletchley Park's geniuses helped to save the merchant navy and Britain's war

■ Cracking Germany's naval Enigma machines proved vital to the hopes of merchant shipping in the Atlantic



The courage of the merchant navy, combined with the prowess of the warships and aircraft that accompanied it across the sea, were vital to keeping Britain's people fed and her war machine rolling. But without the work of the code breakers at Bletchley Park, including the brilliant Alan Turing, their efforts could well have failed.

While the German air force's signals were deciphered and read as early as the middle of 1940, its naval codes proved far more difficult to crack. Even though an Enigma machine had been recovered from U-33 early on in the war, new security measures introduced by the German navy made it largely redundant. But it was the addition of more rotors to the Enigma that made the job of those at Bletchley almost impossible, for they now had to guess which three of the eight rotors had been used that day.

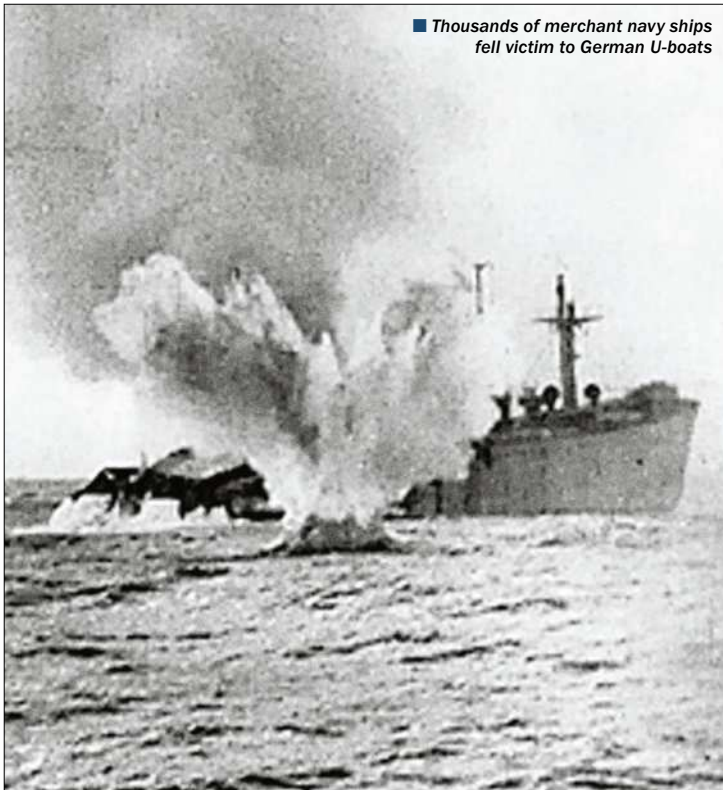
Lacking detailed knowledge of the rotors' wiring meant that they could only decipher a few messages. This fallow period was accompanied by great successes for the Kriegsmarine as it sank massive amounts of merchant shipping. In fact, it wasn't until October 1942 and the capture of U-559's Enigma documents

that Germany's naval codes could finally be broken in significant numbers.

Working from Hut 8, Alan Turing and his team used a machine and his own cryptanalytic process, known as banburismus, to identify the most probable right-hand and middle wheels of the Enigma. By exploiting the Germans' error in requiring all naval Enigma machines on a given network to encipher their message settings from the same three-letter wheel starting position, Turing and his colleagues began to make inroads.

Beforehand, convoys loaded with essential supplies were leaving North America only to be torpedoed en route to Britain. The situation became so perilous that Churchill's advisors began to warn him that the country would soon be facing starvation. But the code breakers saved the day.

Armed with the knowledge of the German navy's movements, the merchant navy and its armed escorts could be safely guided away from the menace of the U-boat wolf packs and reach Britain with the materials (and later men) that it so desperately needed.



■ Thousands of merchant navy ships fell victim to German U-boats



■ Merchant seamen were trained to use machine guns against Axis ships



■ Above: The Kriegsmarine did not admit to sinking the Athenia until 1946

capitalised on its newly won ports to savage the Atlantic shipping lanes.

Despite the miracle of deliverance that was the evacuation of Dunkirk, in which the merchant navy played a critical role in rescuing over 500,000 Allied troops from annihilation at the hands of the Wehrmacht, the early stages of the war were devastating for Britain at sea.

Between July 1940 and the end of October, the Allies lost 282 ships, equating to 1.5 million tons of merchant shipping. And while the 'happy' period soon ended, the sinkings did not. To make matters even worse, until May 1941, merchant seamen's pay ceased as soon as their ship went down. Time floating in the water or in captivity was seen by their employers as 'non-working' time. Usually only equipped with machine guns, few ships stood any chance of defending themselves in the early years of the war. But the tide was about to turn, ironically in part due to Germany's invasion of Norway.

TURNAROUND

At the time of Norway's occupation in April 1940, it commanded the fourth-largest merchant fleet in the world. Despite the request issued by Vidkun Quisling (the Norwegian leader installed by the Nazis) that all Norwegian ships enter Axis-controlled ports, Norway's sailors decided to stand with Britain. The Norwegian Shipping and Trade Mission (Nortraship) was soon established in London, and initially saw two-thirds of its ships placed at Britain's service. It was a partnership that would last throughout the war as Norway shipped tons of supplies to Britain.

Another key turning point was the formation of the Ministry of War Transport on 1 May 1941. Led by Lord Frederick Leathers, it absorbed the Ministry of Shipping and the Ministry of Transport, immediately assuming the right to decide the routes and cargo of every merchant ship. It was a positive step that the British parliament then supplemented by passing the Emergency Work Order in the same month in recognition of the dire situation the country faced.

This required seamen to serve for the duration of the war and guaranteed them pay for that entire period, including time spent adrift or in the hands of the enemy. It also established the merchant navy reserve pool, which ensured that mariners would be allocated to ships in need of crew. Along with the adoption of new escort tactics and aid from both Canada and the 'neutral' US, Britain's chances of not just holding out, but winning, gradually began to improve. The US had already been supplying Britain despite its previously distant stance, and soon took over the responsibility of escort duties in the Western Atlantic.

Grasping the concept that convoys were more difficult for the U-boats to locate than scattered ships had taken the Allies time and cost many lives. However, adopting a policy of permanent convoys after the carnage of 1940 eventually began to bear fruit. This was the result of the admiralty relocating to the headquarters of the Western Approaches Command from Plymouth to Liverpool, affording it more control over the Atlantic convoys due to enhanced communications. Better links with the aircraft

that helped to defend the merchant navy were also established, and the production of radars that were capable of detecting U-boats made a massive impact. The momentum was shifting.

Despite a crisis in 1943 that saw 200 U-boats roaming the Atlantic, and British supplies – especially oil – running extremely low, the Allies effectively secured victory in the battle in the same year (although the Kriegsmarine remained a menace until Germany's final defeat) as the US produced vast amounts of Liberty ships to replace Allied losses. As the German threat receded once more, the merchant navy seized the initiative, shipping men and machinery across the waves as plans for D-Day were drawn up. A huge military build-up commenced even as these brave volunteers continued to risk their lives to ensure that troops already engaged on foreign battlefields remained fed and armed.

VICTORY

Without their sacrifice, the campaigns in the Far East and North Africa would have ground to a halt, permitting the Axis powers to secure more territory and concentrate their troops in other theatres. The crucial platform for the invasion to liberate Europe could not have been established either. Without the troops transported from North America, D-Day would have been impossible. Germany would have eventually gained an unassailable advantage in the Atlantic that would have seen it avoid the second front that proved fatal to its hopes of ultimate victory. It is no exaggeration to say that Britain's merchant navy was the difference for Churchill's people in WWII. Had they failed, Britain would have been lost.

“BRITAIN'S CHANCES OF NOT JUST HOLDING OUT, BUT WINNING, GRADUALLY BEGAN TO IMPROVE”

HOW SCIENCE SANK THE U-BOAT MENACE

SOME OF THE 20TH CENTURY'S GREATEST TECHNOLOGICAL ACHIEVEMENTS WERE DEVELOPED IN DIRECT RESPONSE TO THE THREAT POSED BY DÖNITZ'S WOLF PACKS



It took Germany just six weeks to conquer France at the start of World War Two. The previous conflict had seen its land forces trapped in the meat grinder of the Western Front for years, while its navy had spent much of the war bottled up in the

Baltic by the Britain's more powerful fleet. The fall of France in June 1940, however, and the subsequent capture of French ports along both the Atlantic and Mediterranean coasts were to give Germany unprecedented access to the world's oceans. It was not a fact lost on Admiral Karl Dönitz, who commanded Germany's U-boat fleet. Almost immediately he switched his centre of operations from Kiel in northern Germany to various bases along the Bay of Biscay in Western France. From here he intended to choke Britain of the vital supplies of food, fuel, weapons and troops being sent from North America that it so desperately needed for its survival. Over the next five years, however, his U-boats would go from being the most feared predators in the Battle of the Atlantic to easy prey for the Allies as they developed increasingly sophisticated methods of defence and detection.

In the beginning, however, Dönitz and his U-boat crews were to have it all their own way. Thanks to improved communication technology, the U-boats had powerful radios that could

reach German antennas on the French coast. Using the Enigma machine to encrypt messages into a seemingly unbreakable code, Dönitz could conduct the Battle of the Atlantic from the safety of an onshore operations room. As soon as the crew of one U-boat spotted a British convoy, Dönitz was informed and he would then direct all U-boats in the area into a 'wolf pack' before orchestrating a precision ambush on it. The results were devastating. Before the Fall of France, the German navy managed to sink around 80,000 tonnes of British shipping per month. After France's capitulation, that figure would soar to more than 230,000 tonnes per month. Little wonder that the U-boat crews would dub the opening exchanges of the Battle of the Atlantic 'the Happy Time.'

These early successes had come as a complete surprise to both the Nazi high command – which now sped up U-boat production – and the British admiralty, who falsely believed their ships would be safe for two reasons. Firstly, the German U-boat campaign of World War I had been largely unsuccessful once the Allies began organising commercial ships into crowded convoys protected by battleships. In fact, the Imperial German Navy had ended up losing more than half of its U-boat fleet during the conflict because of this tactic without significantly disrupting the flow of supplies into Britain.

"USING THE ENIGMA MACHINE TO ENCRYPT MESSAGES INTO A SEEMINGLY UNBREAKABLE CODE, DÖNITZ COULD CONDUCT THE BATTLE OF THE ATLANTIC FROM THE SAFETY OF AN ONSHORE OPERATIONS ROOM"



HOW SCIENCE SANK THE U-BOAT MENACE

■ Once a destroyer's ASDIC sonar had located a U-boat's location, depth charges were then used to sink it or force it to the surface



There was no reason, in 1940, to believe that what had thwarted the U-boats in the First World War wouldn't be just as effective in what was fast becoming a second global conflict. Secondly, the British had spent the interwar years developing a new technology that they believed would further protect their shipping from the U-boat menace – the ASDIC detection system, better known today as sonar.

'SEEING' BENEATH THE WAVES

Work on the ASDIC had actually begun as early as 1916 on the orders of the British admiralty. Eager for a more sophisticated underwater detection device than the ineffective hydrophone system then being employed, they recruited Canadian physicist Robert William Boyle and British scientist AB Wood to work on the top-secret project. By mid-1917 the two men had produced a prototype. The device used quartz piezoelectric crystals capable of generating an electrical charge or pulse to produce the first-ever practical underwater sound detector. To maintain total security around the project, all reference to 'sound experimentation' was banned from official documents. Instead the early name for the work, 'supersonics', was changed to 'Asdics', with the ASD prefix being an acronym for Anti-Submarine Division.

The ASDIC was essentially a transmitter/receiver that beamed out a sound wave through the water in a given direction, almost like a searchlight. If the transmitted sound wave (heard as a ping) struck a submerged object, it would bounce back until it was picked up again by the ASDIC's receiver. The length of time it took for the echo of the transmission to be heard by the operator was then used to measure the range: the quicker the returning echo, the closer the object. If an outgoing ping hit a submerged target, the operator would hear the echo as a distinct beep. He would then sound the alarm, inform the bridge of both the range and bearing or direction of the target and then immediately start to sweep pulses left and right of the target to determine

"THE GERMANS ALSO DEVELOPED WHAT IS CONSIDERED THE WORLD'S FIRST STEALTH SUBMARINE"

whether it was moving or not. By continuing to monitor the submarine's movement, he could also determine whether it was moving closer or further away. Once the faster-moving surface ship was above the submarine, depth charges could then be used to sink it or force it to the surface where the ship's artillery could finish it off. That, at least, was the theory.

Boyle and Wood had to wait until 1920 before their ASDIC got its first real-world trial, when the armoured cruiser HMS Antrim successfully used it while on exercise. Wholesale production of the device started in 1922 and by the outbreak of World War II, ASDIC was operational throughout the Royal Navy's destroyer squadrons.

BLIND SPOTS, DECOYS AND STEALTH SUBS

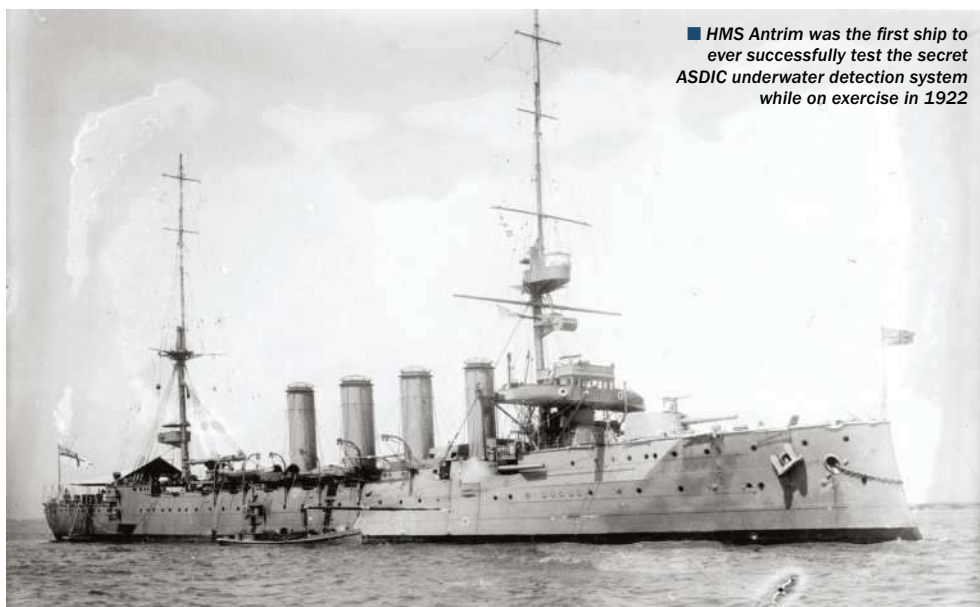
As clever as the ASDIC was, however, it was not without its limitations. The device's transmitter head was fitted beneath a ship's hull, encased in a large metal dome which itself was filled with water. This was intended to act as a buffer against interference caused by the sound of the ship cutting through the waves. While this worked well at slow to moderate speeds, as soon as a ship started to travel faster than around 18 knots, so much noise was generated that contacts became almost impossible to find. The same was true if the weather was bad – which it frequently was in the North Atlantic – when rough seas could clutter a ship so violently that the ASDIC's echo was effectively drowned out.

And it wasn't just interference at the surface that an ASDIC operator had to contend with. Echoes would bounce back off many things – schools of fish, whales, wrecks, vertical sea currents and even the wakes of friendly ships could all potentially be mistaken for a lurking U-boat. Differing temperatures at different

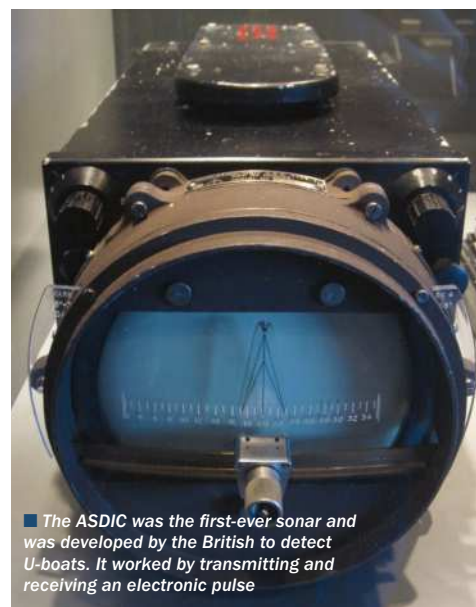
depths could also play havoc with detection – a fact the U-boat commanders soon worked out and deliberately used to hide from the ASDIC's 'beam' of sound.

Because the sound waves had to be transmitted in an arc, there was also an unavoidable blind spot directly beneath the ship when using the device. When a U-boat was detected, the attacking ship would typically steam directly towards the contact at 15 knots – a speed at which the ASDIC's operator could maintain a fix on the target. As the range closed, however, and the U-boat passed under the beam at around 275 metres, contact would be lost altogether. This made a precise strike with depth charges all but impossible, as the ship's captain then had to estimate the position of the U-boat – and prime his depth charges to explode at that level accordingly – as well as guess at any changes in direction and/or depth the U-boat might have made at the last moment. U-boat commanders became adept at developing evasive tactics. Running from an Allied warship and forcing it into a straight-on chase meant the ASDIC often picked up the U-boat's wake rather than its hull, then – once it was caught and the U-boat commander could hear the ship's propellers throbbing above them – he'd order that the vessel make a hard turn, or to dive to a greater depth.


As the war progressed, the Germans also began working on different decoy methods. These included releasing what they called Bold pellets into the water via an ejector system called a Pillenwerfer (or pill thrower). The pellets were made of calcium hydride which, when they reacted with the seawater, would create a huge cloud of hydrogen bubbles which could confuse ASDIC devices. The Germans also developed what is considered the world's first stealth submarine. The U-480, which was launched in 1943, was equipped with a special rubber coating called Alberich – named after the German mythological character whose magical



■ HMS Antrim was the first ship to ever successfully test the secret ASDIC underwater detection system while on exercise in 1922



■ The ASDIC was the first-ever sonar and was developed by the British to detect U-boats. It worked by transmitting and receiving an electronic pulse



■ HMS Courageous was one of the first ships to be detected with the new airborne radar system while an exercise in 1937. She was sunk by a U-boat two weeks into the war

THE SCHNORCHEL

The simple ventilation system that Admiral Dönitz hoped would keep his U-boats invisible for longer

Unlike modern submarines, U-boats weren't designed to spend long periods of time submerged. Instead, they were viewed as torpedo boats with the defensive capability of diving. Once submerged, the U-boat was then reliant upon battery power for propulsion. These batteries needed regular recharging. This was done by the boat's diesel motors acting as a dynamo and they could only be used on the surface. This obviously severely limited the amount of time a U-boat could stay submerged.

After invading the Netherlands in 1940, Germany discovered that the Dutch navy had been experimenting with something called the Schnorchel.

This simple ventilation system allowed a submarine to run off its diesel motors at periscope level almost indefinitely, making it less vulnerable to detection from the air. Initially, the Germans paid the Schnorchel little attention, but as the war progressed and increasing numbers of U-boats were lost to air attack, its usefulness was reconsidered. Throughout 1944 around half Dönitz's fleet was fitted with the device in an attempt to reverse its ailing fortunes. Ultimately, though, the Schnorchel proved highly ineffective, not least because it slowed a U-boat's submerged speed down to just 6 knots – at faster speeds, the ventilation pipe simply snapped off.

THE ALLIES STRIKE BACK

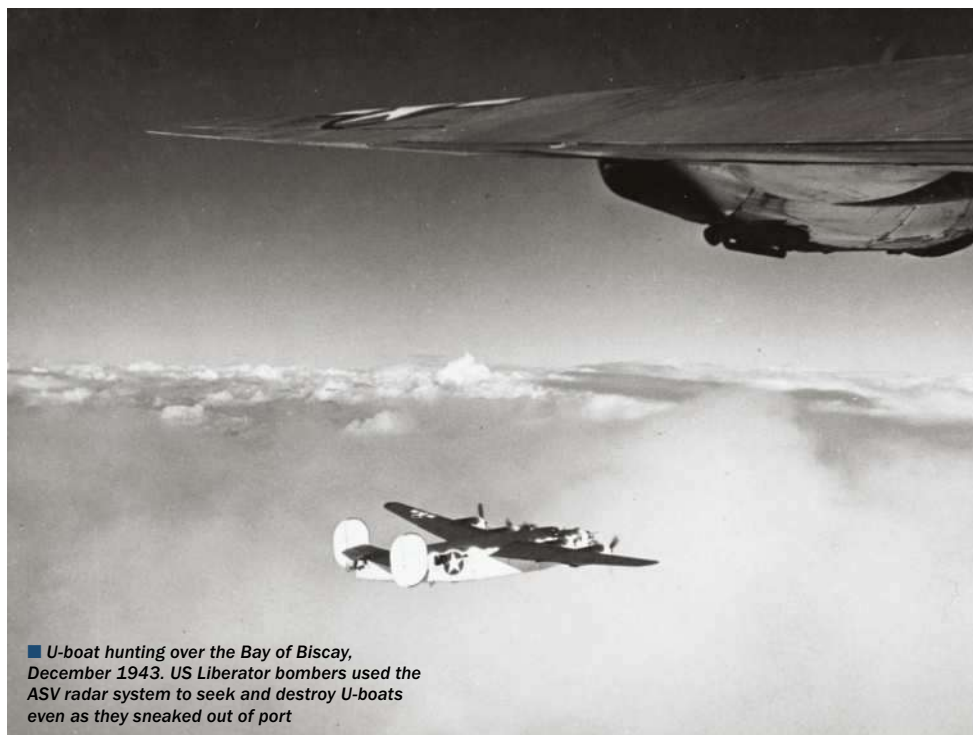
helmet gave him the power of invisibility. Although not completely foolproof, the coating's perforated inner layer and smooth outer one formed air pockets that, in the right conditions, could effectively muffle sonar waves.

THE BIRTH OF RADAR

The biggest drawback with ASDIC, however, was that it was rendered completely useless should a U-boat launch an attack while on the surface. Which is precisely how many U-boat wolf packs preferred to engage Allied shipping anyway. With the majority of U-boats only managing a submerged top speed of 7.6 knots, they struggled to keep up with even the slowest Allied convoy while under the water. It was much easier, therefore, to get in range at night or in poor visibility, when it was difficult to detect their slender shape, sink as many ships as possible, then dive to escape.

The admiralty hoped to counter this tactic by equipping destroyers and other ships protecting the merchant ships with marine radar, allowing them to monitor activity on the surface as well as beneath the waves. It was a German, physicist, Heinrich Hertz, who had carried out the very first work on radar (an acronym for RAdio Detection And Ranging) back in the late 19th century. It had been the British, however, fearing future attacks by air, that had begun looking into developing radar defences in the 1930s and by 1938 had created the world's first effective radar chain. This pioneering work would play a vital role in defeating the German Luftwaffe during the Battle of Britain, before eventually helping to destroy the U-boat threat and win the Battle of the Atlantic.

Initial research into radar had shown that flying objects could be detected using electromagnetic waves by transmitting a beam of radio signals into the air, which would be



■ U-boat hunting over the Bay of Biscay, December 1943. US Liberator bombers used the ASV radar system to seek and destroy U-boats even as they sneaked out of port

bounced back to the transmitter if it hit an object of significant size or density. Because of their long wavelength, the earliest marine radar systems proved totally impractical for detecting shipping, meaning binoculars remained the most effective counter-measure for detecting surfaced U-boats until May 1941, when the Type 272 radar was introduced. Using a much shorter wavelength (10cm as opposed to 7 metres), the convoys finally found themselves equipped with a radar system that could effectively detect a surface vessel. It was to make a huge difference to the convoys'

defences and came at a vital time in the unfolding battle. In the months leading up to its introduction, U-boats were sinking around 50,000 tonnes of Allied shipping every single week.

But U-boats weren't now just vulnerable to detection by ship-borne ASDIC and radar, but also from the air – from where the Battle of the Atlantic would eventually be won. When the war had started, British military chiefs had soon realised that air superiority over the Atlantic would be key to keeping the shipping lanes safe, and had planned on policing the entire ocean with the UK's seven aircraft carriers until the sinking of one of them – HMS Courageous, just weeks into the war – scared them off of the idea. Although a certain amount of top cover could be provided for the Allied convoys by planes taking off from British-held bases in Iceland, Greenland, the Faroe Islands and Northern Ireland, RAF and Coastal Command's planes simply didn't have the range to plug what was swiftly dubbed the 'Air Gap' in the vast heart of the Atlantic Ocean. It was chiefly in this gap that from June 1940 onwards, that Dönitz's wolf packs did most of their hunting, and although aircraft would soon be developed that could fly greater distances, trying to patrol such a immense area without the help of electronic detection devices would have proved highly ineffective.

THE MARK 24 MINE

Meet the world's first anti-submarine torpedo, which sank 31 U-boats and damaged a further 15

As well as defensive roles, tracking devices were used in offensive ones. In 1941, the US navy began developing an air-launched torpedo that could 'home' in on its target. The solution was to again use sound as a means of 'seeing' underwater to guide the torpedo. Early experiments with acoustic transducers produced a fresh problem, however: how to ensure the torpedo was fast enough to catch a submerged U-boat, yet slow enough that noise generated by its movement through water didn't interfere with the noise it was tracking.

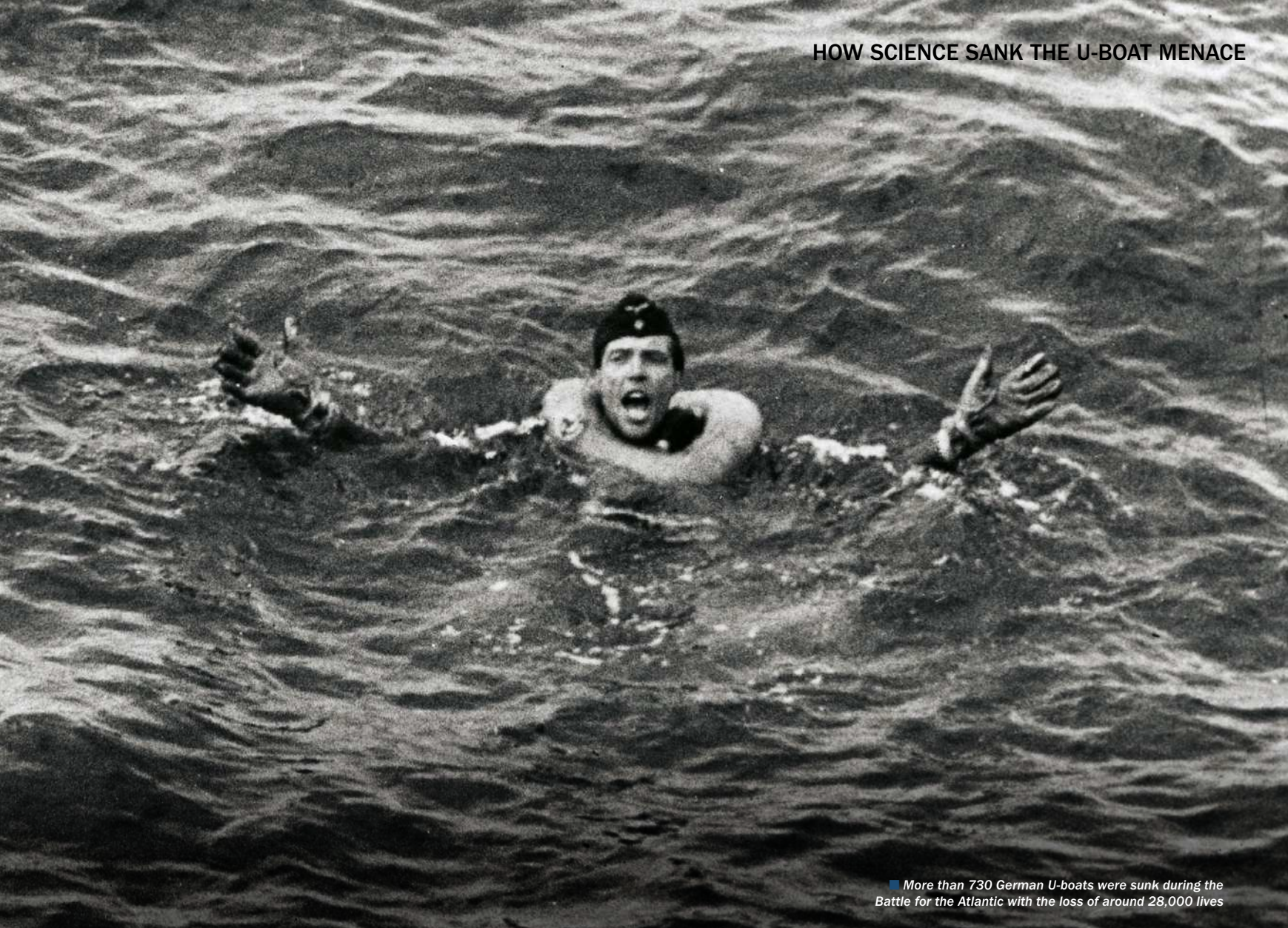
By 1943, a design had been found that worked in the Mark 24 Mine (so named for security reasons). This 'mine' was, in fact, a 310kg torpedo – soon nicknamed Fido – which used a 5hp electric motor to propel it at 12 knots to deliver a 42kg high-explosive

warhead. Guidance was provided by four hydrophones arranged equidistantly around the mid-body of the torpedo, which simply homed in on the loudest noise. Upon entering the water, the Fido would perform a circular search at a predetermined depth as its hydrophones searched for the target. Once acquired, control shifted to an acoustic homing system which then guided the torpedo's steering system towards its quarry.



CONTROLLING THE SEAS AND THE SKIES

Fortunately, when the boffins had started working on Britain's land-based radar defences back in the 1930s, they had also begun work on developing an airborne radar system. From the start, it was clear that any radar that operated in the air would need to be much smaller than the huge stations



■ More than 730 German U-boats were sunk during the Battle for the Atlantic with the loss of around 28,000 lives

“WHEN THE BOFFINS HAD STARTED WORKING ON BRITAIN’S LAND-BASED RADAR DEFENCES BACK IN THE 1930S, THEY HAD ALSO BEGUN WORK ON DEVELOPING AN AIRBORNE RADAR SYSTEM”

that were being built on the ground. An airborne radar also needed a much shorter minimum range, as it would need to guide the aircraft’s crew directly towards its target. Both these problems were solved by the development of significantly shorter wavelengths than those used by land-based radars.

Two systems were developed: the AI (airborne intercept) radar and the ASV (airborne surface vessel) radar which would be the one used for maritime patrols. This ASV system was successfully tested on 17 August 1937 when a Avro Anson flying in weather conditions that would have rendered conventional reconnaissance impossible managed to track three Royal Navy ships off of Suffolk’s North Sea coast near Felixstowe – ironically, the ill-fated HMS Courageous was among them.

This new airborne system fitted a transmitting antenna on an aircraft’s nose to project a broad beam of pulses in front of the pilot, while two receiving antennae fitted to the aircraft’s wings searched for any bounced-back

radio waves. By the end of 1940, almost 50 Coastal Command planes had been fitted with the ASV Mark I radar. Initial results were not good, however, and a flurry of improvements were made. The ASV Mark II was in development from early 1940 and by November of that year had scored its first success, when it helped an Armstrong Whitworth Whitley light bomber locate and then partially destroy a U-boat in the Bay of Biscay.

By the summer of 1941, the ASV Mark II radar had helped Coastal Command to increase its daytime attacks on U-boats by around 20 per cent. The Germans were now prompted to develop their own technology to counter the airborne radar’s influence and from late 1942, Dönitz’s U-boats began carrying a ‘Metox’ – a radio receiver that allowed the crew to detect when they were being monitored by the ASV Mark II. This simple device proved highly effective and Allied shipping losses started to creep up again. Constant improvements were made to the ASV system between early 1943

and the end of the war. In fact, a further 11 versions ended up being fitted to Coastal Command aircraft, both in anticipation and in response to improved German counter-detection technology.

While the invention of the Bletchley Park’s code breaking machine back in leafy Buckinghamshire would ultimately do for Dönitz’s campaign, a much simpler innovation would help deliver the killer blow out in the wilds of the Atlantic. The Leigh Light was the brainchild of Squadron Leader Humphrey de Verd Leigh. It was a 22-million candlepower, 24-inch retractable searchlight that was slung underneath the fuselage of sub-hunting Allied aircraft. Introduced in mid-1942, it was immediately dubbed ‘the dustbin’ because of its shape, but far from being rubbish it actually rendered the U-boats vulnerable at the very time when they had been at their most dangerous – at night. After locating a surfaced U-boat with its radar, an Allied aircraft could then swoop down on it as it was stalking a convoy and light it up. Not only did this make it easier for the attacking aircraft to hit the U-boat, but it also temporarily blinded its crew in the first few vital moments of the attack as they struggled to respond. It was to prove the final part of the technological puzzle in the war against Dönitz’s deadly wolf packs.

FORGOTTEN HEROES OF THE ARCTIC CONVOYS

TREACHEROUS WATERS, FREEZING COLD AND RELENTLESS ATTACKS
FROM AIR AND SEA – WELCOME TO THE WORST JOURNEY IN THE WORLD



The Arctic Convoys' 'raison d'être' came with 'Barbarossa', Hitler's attack on the USSR, commencing 22 June 1941. Stalin immediately demanded help from the Allies.

The most direct route was by sea, navigating a narrow 'funnel' between the Arctic icepack and German bases in northern Norway, to reach the Soviet ports of Murmansk and Archangel, the latter only being accessible in summer. So from September 1941, ships began the hazardous voyage.

British and American chiefs of staff were against this plan, citing stretched resources, but their premiers insisted. One of Churchill's objectives over 1941-42 was to engage German forces anywhere, so he demanded a 'cycle' of Arctic convoys. First Sea Lord Admiral Sir Dudley Pound questioned the diversion of resources from the Atlantic, but the prime minister wasn't listening.

This was no picnic though. Convoys enduring a week-long passage at eight or nine knots (slower than a runner) were sitting ducks against attacks from above and below. Crews loathed the winter darkness, particularly when ice ventured south and ships became coated in it. Sailors worked relentlessly, hacking away dangerous weights of ice and testing weapons because of freezing lubricants. 'Arctic Smoke', a layer of mist overlaying the freezing water, made seas particularly treacherous, while in more stormy weather, mountainous seas loomed more than 12 metres high from trough to crest.

On one occasion, a monster wave stripped the armoured roof from the forward gun-turret of HMS Sheffield. Another time, a 'moving mountain' of water crashed so hard on the flight deck of HMS Victorious that the forward aircraft lift was unusable. It is inconceivable that the sea could bend four-inch armour, but it did. On the Murmansk passage almost every ship, even the biggest, suffered damage.

Then there were the Germans, necessitating naval crews to often be at action stations 22 hours a day. There wasn't much sleep – a nap often taken fully clothed on a bench or even standing up. When U-boats formed a line

ahead, the Royal Navy attempted to charge through and disperse them. Some sailors began to prefer rough seas as these kept the U-boats away.

It was impossible to stay dry on the convoys – heavy layers of clothing didn't keep the cold out and fur-lined boots failed to keep feet warm. When it was really cold, it was barely possible to breathe and sailors didn't dare to touch metal as it burned and stuck to their fingers, prompting a visit to the sick bay.

The summers were no better, with almost endless daylight increasing ships' vulnerability. The early forays, however, were promising, as a few British merchantmen made the trip late in 1941, arriving unscathed, with small quantities of tanks, aircraft and rubber. This excursion barely registered with the Germans, but the sailors' luck wouldn't last.

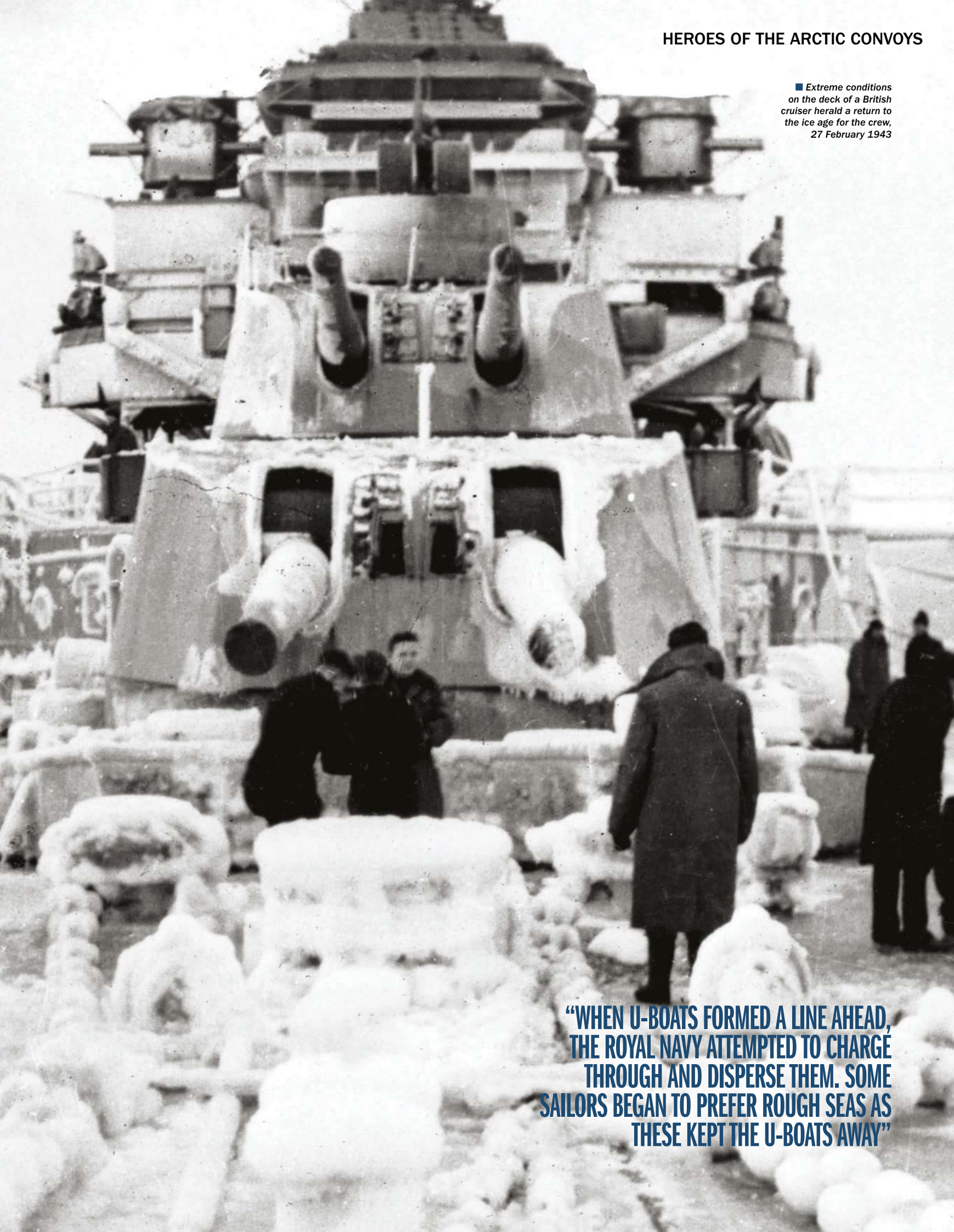
Some of the perils were illustrated early. On 10 December

1941, the crew of Harmatis spotted smoke, then found a flaming lorry careering about the hold. The ship limped back to the Clyde, but poor cargo stowage remained a problem, with loads breaking loose and threatening ships' survival. Much material arrived in Murmansk damaged, a sickening outcome for battered crews.

The earliest convoys were coded 'PQ' (outbound) and 'QP' (homeward bound) and these became one of WWII's naval epics. With the threat of German capital ships, such as the



■ Extreme conditions
on the deck of a British
cruiser herald a return to
the ice age for the crew,
27 February 1943



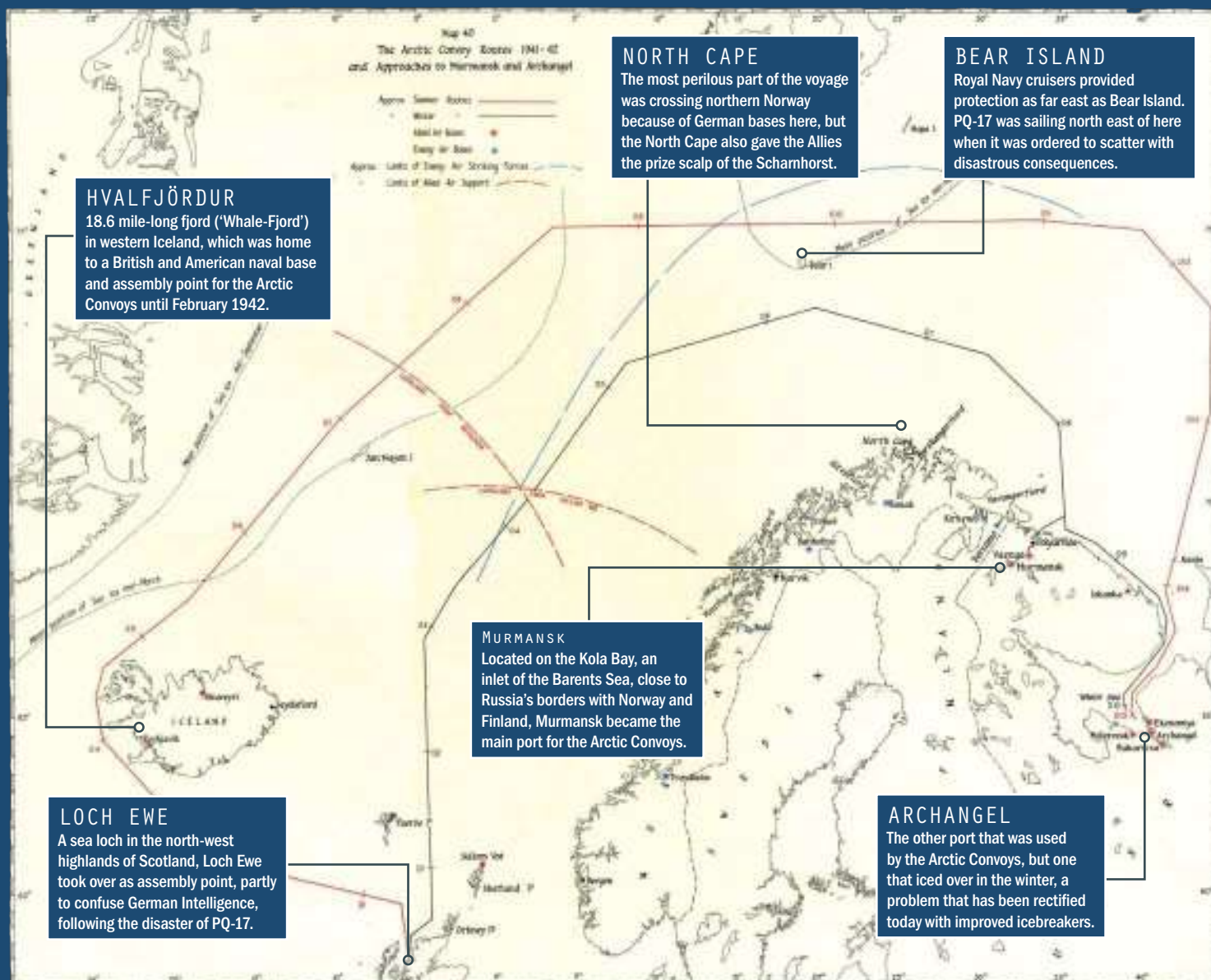
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Soviet warships escorting Arctic convoys repel a German air attack in the Barents Sea on the Eastern Front

THE WORST JOURNEY IN THE WORLD

The 'Murmansk Run' was less than 2,500 miles but across the cruellest sea of all



SURVIVOR OF A FROZEN WAR: GEORGE OSBORNE

ACTING LEADING SEAMAN

Born in 1922, Osborne took part in convoy duties on HMS Sheffield and experienced a detonating mine as well as the sinking of the Scharnhorst

WHAT WERE CONDITIONS LIKE DURING A CONVOY?

The cold was the biggest enemy really. We never had any hot drinks and the only redeeming feature was that we would get a cup of hot soup on the noon watch. At the time we didn't really think about it but looking back it was horrific. We were huddled up in a shelter or behind the gun shield. Doing it for four hours was a long time but sometimes it was six hours and that wasn't very nice at all. The temperature was always below freezing and the further north you went the colder it got.

We eventually received more sensible clothing but on the convoys, all we had initially was the standard oilskin. They then gave us duffle coats that were warm but once they got wet they began to stink and you never had time to get them dry. We eventually had gloves and overcoats but they also gave us wool long johns and you itched constantly.

WHAT HAPPENED WHEN HMS SHEFFIELD STRUCK A MINE OFF ICELAND ON 3 MARCH 1942?

We were three hours out of Reykjavik when we struck a mine. As I came out of the bathroom, I heard this thud and wondered what it was. I got ready and we went to action stations. We were told that we'd struck a mine although nobody was really sure whether it was a mine or torpedo. The mine had stuck in between the ammunition magazines and in between those were the rum and the officers' wine store. It was Sod's Law that the mine got the rum! All the empty barrels floated out and in the moonlight they looked like mines so there was a bit of a panic. The only casualty was a marine sentry who was stationed outside the captain's cabin and they found him floating in the water.

We got into an inlet off Iceland and started repairs. A Canadian officer went ashore and commandeered all the coke that he could find. The coke would absorb the water so they filled the hole with that. The next problem was how to sail the 1,600 kilometres from where we were to Newcastle and you couldn't rely on the weather, but we eventually got the ship down to the Tyne.

CAN YOU DESCRIBE YOUR EXPERIENCES ON CONVOY WHEN HMS SHEFFIELD TOOK PART IN THE SINKING OF THE SCHARNHORST?

The Sheffield was the most sophisticated radar ship in the fleet and we picked up the Scharnhorst and chased her with two other cruisers. We were steaming at 26 knots when the ship shuddered and suddenly halted. The other cruisers carried on and we were left in the Arctic Sea all alone while the engine room worked feverishly on repairs. Then all of a sudden it came through that an unidentified ship was nine kilometres away. All the guns were loaded because we didn't know who it was. I remember watching the range close from nine to six kilometres and my life went before me. It was the first time I

felt really scared. Eventually we discovered it was one of our ships so we got underway. We could hear the gunfire coming from the ships. They finished the Scharnhorst off. We didn't see it because we weren't allowed out on the upper deck but the ship steamed past where she was sinking. More than 1,000 lives were lost that day.

HOW DID YOU FEEL ABOUT THE ROLE OF THE CONVOYS? DID YOU CONSIDER IT AS JUST YOUR JOB OR WERE YOU AWARE OF THE WIDER IMPORTANCE?

We knew it was important and something we had to do. The people that I really felt sorry for were the sailors on the escort vessels and the merchant seamen. They were the real heroes. The merchant seamen were living on time bombs but they went ahead and steamed on. On the small naval ships, they didn't have cooks and had to buy and prepare their own food. Just imagine what it was like trying to prepare a meal with the ship rolling and water going onto the deck, it must have been hell.

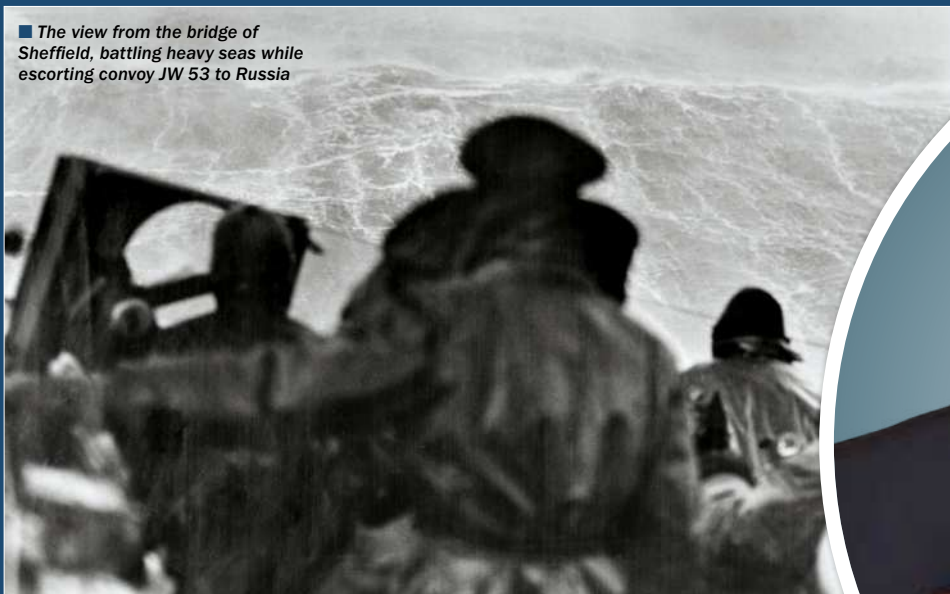
WHAT ARE YOUR OPINIONS ON THE LATE ISSUING OF THE ARCTIC STAR MEDAL IN 2013?

Even Churchill said how bad the convoys were, but nobody stood up and said we should have had a medal. One officer fought for the medal until he died and I'm still convinced that when Vladimir Putin came and issued a medal to some of the veterans, it was only then that the British government agreed to award the Star – but that's just my opinion.

■ HMS Sheffield in calmer waters, c. 1944



■ The view from the bridge of Sheffield, battling heavy seas while escorting convoy JW 53 to Russia



■ Before taking part in convoy duties Osborne survived an attack on his ship by the battleship Bismarck prior to her sinking



Image: Dorset Echo

THE ALLIES STRIKE BACK

■ Ice forms on a 50-centimetre signal projector on the cruiser HMS Sheffield while escorting an Arctic convoy to Russia, December 1941



“ARRIVAL WAS NO PARTY. THE KOLA INLET, THE FJORD LEADING TO THE PORT, WAS LIKENED TO HELL – IF IT WERE POSSIBLE FOR HELL TO BE THAT COLD – WITH LUFTWAFFE ATTACKS ON MURMANSK OCCURRING ALMOST DAILY”

Tirpitz, the convoys needed almost as many warships as merchantmen. The warships were fitted with anti-aircraft guns, while destroyers provided close protection against U-boats. Between them they sent up a formidable barrage against Heinkels.

Royal Navy plane-carrying cruisers offered safeguards against German destroyers as far as Bear Island, north of Norway, when they turned back because of increased air threat. Merchant Navy officers ploughed on without air cover and accusations flew that they were treated like children and kept in the dark. The Germans were also paranoid about losing capital ships, however, so ‘action’ was frequently broken off, as their vessels fled for the sanctuary of a Norwegian fjord.

From 1942, the British began transporting substantial shipments, which prompted a firmer German response. The unlucky *Hermatis* was hit by two torpedoes on 17 January, water flooded its hull but thankfully the damage was contained and it limped into Murmansk, towed by tugs, yet still attacked by Heinkels. The same day, HMS *Matabele* was torpedoed, with the detonation occurring in the magazine. Only two survivors were rescued and many froze to death in the water before help arrived.

A German long-range aircraft, usually a Focke-Wulf Condor, buzzed about, transmitting the convoy’s position to the Luftwaffe in Norway. The stakes were rising and the last convoy enjoying a relatively straightforward passage was PQ-11 in February. PQ-12 suffered from thick pack-ice, then played a deadly game of ‘blind man’s buff’ with the infamous German ship the *Tirpitz*, which intelligence reported was at sea at the time.

March 1942 saw PQ-13 scattered in a storm, then savaged, with a quarter of its 20-odd merchant ships sunk by a combination of U-boats and bombers. A torpedo malfunction caused *Trinidad* to cripple itself while attempting to sink a damaged German

■ HMS *Honeysuckle* alongside the aircraft carrier HMS *Trumpeter* in the Kola Inlet

■ An oil tanker erupts into flames during one of the convoys



SURVIVOR OF A FROZEN WAR: CLAUDE SEALEY LEADING STOKER

Born in 1923, Sealey served on HMS Jason and witnessed Russian brutality first-hand, as well as surviving German attacks and a terrifying storm

CAN YOU DESCRIBE THE CONVOY YOU WERE PART OF IN 1943 AND THE STORM YOU ENCOUNTERED?

In early February, we were issued with warm clothing but we didn't realise we were going on a Russian convoy. We went up to Loch Ewe, which was where the convoy was sitting waiting. There were around 30 ships and it was so bleak. I thought "Oh, my goodness!" but before we knew where we were, we set sail.

We had a rough voyage and they said it was the worst storm recorded in the North Sea at that time. I was down in the boiler rooms and we had a 'port sea' where the water was coming into the ship from the left side and we nearly turned over. I was scared, the ship went right over and all the lights went out. I don't know how many degrees it turned but it didn't right itself for a long time and we all thought, "This is it." It eventually recovered but the storm lasted for four days, it was terrible.

WHAT DID IT FEEL LIKE TO BE REPEATEDLY ATTACKED BY THE GERMANS?

It was horrible. They used to come from Norway with both air and U-boat attacks. We were a 'rescue ship' so we were right at the back of the convoy. If any part of the convoy got hit, those who worked on the upper decks knew what was happening but we didn't get any information down below. I was annoyed about [that].

We didn't get hit but there was one episode where we were astern of the convoy at night when we got an order for full speed ahead. There was panic in the engine room as somebody on lookout saw a U-boat overtaking us on the surface. We dropped a full pack of depth charges over them when they swerved because you couldn't turn any lights on. We didn't know whether we sunk it or not. There were a few more attacks afterwards and we were a bit concerned because they were mainly targeting the merchant ships. However, once we approached Russia, we were distracted because we started to ice up.

DID YOU FEEL VULNERABLE WORKING BELOW DECKS?

Because I was often in the boiler room, people have said, "I bet you were

warm" but we were freezing cold. I'd be in there wearing my overcoat like everybody else. I felt vulnerable in there but most of the time I didn't think about it because we were all busy. We just had to adapt and get on with it.

WHAT WERE CONDITIONS LIKE WHEN THE CONVOY REACHED RUSSIA?

We reached a little naval base called Polyarny. When we came out on deck there was snow and ice everywhere and the first thing I saw was a funeral. There were these black figures carrying a coffin so that didn't cheer us up, it was awful.

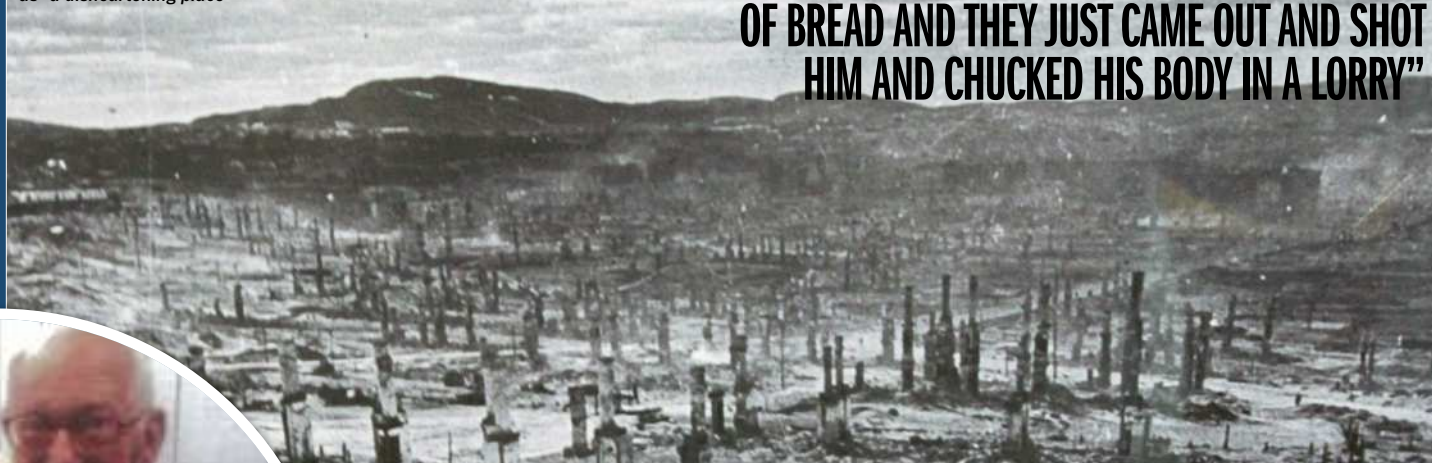
Afterwards, we carried on near to Murmansk where we provided anti-aircraft protection while the cargo boats were unloaded. German bombers used to come over a hill, drop a few bombs and then head straight off. They were quick so that we couldn't respond in time as they mainly targeted the merchant ships. That wasn't very nice and there was many a time when I had to run out of the bathroom and race to the engine room in the nude. That's how it was.

We arrived in Russia at the end of February 1943 and we didn't leave until August, which was disappointing because we thought we'd go straight back. One day I came out of the engine room in August and went out on deck at Archangel. I saw all these old men, women and children crying out for us to take them. They knew we were leaving that day to return to the UK, the poor devils were treated so badly by their own people, I remember there was one old man who stole a loaf of bread and they just came out and shot him and chucked his body in a lorry. It was as bad as that and commissars sometimes chased us.

HOW DID YOU FEEL ABOUT THE ROLE OF THE CONVOYS?

I think the convoys were a worthwhile thing to do because it helped the Russians. They reckon it was all our tanks and aircraft that we took up there that helped to win the war. The Russians did make their own equipment when they attacked Germany and pushed them back, but before that it was all our stuff that went up there. It was well worth it, no doubt about it.

■ The ruins of Murmansk after a bombing raid. Sealey remembers the Russian port as "a disheartening place"



"THERE WAS ONE OLD MAN WHO STOLE A LOAF OF BREAD AND THEY JUST CAME OUT AND SHOT HIM AND CHUCKED HIS BODY IN A LORRY"



■ Left: After convoy duties, Sealey took part in the initial naval assault on D-Day and was later wounded during a friendly-fire incident when 117 Royal Navy personnel were killed

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ASSOCIATION**



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The association is a charity dedicated to former and current personnel of the Royal Navy. It provides services from welfare and employment advice, fundraising and social events with more than 300 branches in the UK and overseas.

For more information visit www.royal-naval-association.co.uk

destroyer. Two lifeboats got away from the doomed Induna, with badly burned men, but hypothermia quickly finished off the injured and seven died in the first night. In desperate conditions, the boat's fresh water froze. One lifeboat was found with just one man from nine still alive. Of the 64-man crew, only 24 were rescued, 18 of whom lost limbs to frostbite.

The following month, PQ-14 was mauled. HMS Edinburgh fought off a German destroyer attack, but Empire Howard was torpedoed, the engine room staff blown to bits as the ammo cargo exploded. 40 others jumped into the sea and all but nine succumbed to blast injuries when a trawler tried to depth-charge an attacking U-boat.

Later in April, PQ-15 saw the destroyer Punjabi cut in half when it crossed the bows of battleship King George V, also damaged when the destroyer's depth charges exploded. Matters didn't improve on later homeward trips, where six ships were lost on QP-13, after straying into a British minefield off Iceland.

In theory, the convoys were better protected from April, as the first CAM ships were introduced, affording primitive air cover. These were merchantmen with a catapult Hurricane, the pilot parachuting into the sea after one sortie. In theory he had, at best, a 50/50 chance of rescue before freezing.

Churchill rejected Royal Navy pleas to suspend summer convoys as he tried to placate Stalin, who raged against the Allies for delaying the Second Front. In the meantime, losses suffered by the Arctic Convoys cut little ice with him. The prime minister wanted PQ-16 in May, even if only half the ships got through; he feared the political consequences of cancellation. The supplies delivered over 1941 and 1942 were mostly of symbolic significance, a key indicator of the Western Allies' determination to support Russia.

PQ-16 seemed to vindicate Churchill with five-sixths of the convoy reaching Murmansk. Showing this was a joint effort, Polish destroyer Garland took shocking casualties, but made it with "Long Live Poland!" scrawled on the ship's superstructure in the crew's blood. As one Merchant Navy officer acknowledged: "They were hard men." 371 were rescued from lost ships in astonishing feats of courage and skill, but how long the merchantmen could be asked to continue was a moot point. One Royal Navy senior officer warned the Admiralty that while his men were paid to do this job, they were asking too much of the Merchant Navy.

The RN suffered too though, cruisers Trinidad and Edinburgh were lost on return trips in May. It seems invidious to single out one individual, but on the Trinidad, engineer officer Lieutenant

"ONE LIFEBOAT WAS FOUND, WITH JUST ONE MAN FROM NINE STILL ALIVE. OF THE 64-MAN CREW, ONLY 24 WERE RESCUED, 18 OF WHOM LOST LIMBS TO FROSTBITE"

John Boddy, refused to abandon his stokers. Although concussed by a bomb blast, he was last seen trying to free them from beneath jammed hatches.

If one convoy epitomised the gauntlet though, it was PQ-17 in June 1942, the largest yet sent. It became one of the greatest naval disasters of WWII, and as such, was veiled in secrecy. The convoy iniassembled at Hvalfjord in Iceland, with 36 ships, mostly American, and sailed on 27 June with more than 150,000 tons of military and general stores, including nearly 600 tanks, 300 planes and more than 4,000 other vehicles. Before it left, British codebreakers warned the Admiralty that the Germans intended a major effort against the convoy, including capital ships. Finally, Hitler intended to hit the convoys hard.

THE BATTLE OF THE NORTH CAPE

December 1943: an ill-judged sortie by the German battleship Scharnhorst saw it sunk in the Battle of the North Cape

Hitler refused to sanction warship attacks until Scharnhorst was let off its leash in December 1943, slipping out of Altenfjord to attack convoy JW55B. With Tirpitz laid up following an attack by midget subs, it was likely Scharnhorst would attack the convoys as Hitler needed to stem the flow of supplies to Russia.

The heavily-armoured pocket-battleship – with nine 27-centimetre guns, gross tonnage of 38,000 and top-speed of 31 knots – missed its quarry due to poor visibility and then became separated from its own destroyer escort.

Scharnhorst was unaware that a Royal Navy long-range protection group was trailing it. The British fleet was led by the battleship, the Duke of York, along with cruiser Jamaica and four destroyers. The first intercept occurred early on Boxing Day, the British strategy being for the cruiser and destroyers to hold Scharnhorst at bay until Duke of York was ready to press home its attack. Above all else, it shouldn't be allowed to wriggle out of the net.

Norfolk took out one of Scharnhorst's radio sets with a shell, but the German ship turned-tail and looked like it would out-run its adversaries as it tried to flee for Norway.

It was the evening of the same day by the time the British ships caught up with their quarry for the final time and the main battle commenced. According to one eyewitness aboard Scorpion, it was this ship that fired the torpedoes that slowed the leviathan up. Duke of York came up behind, with a pair of destroyers to port and another pair to starboard.

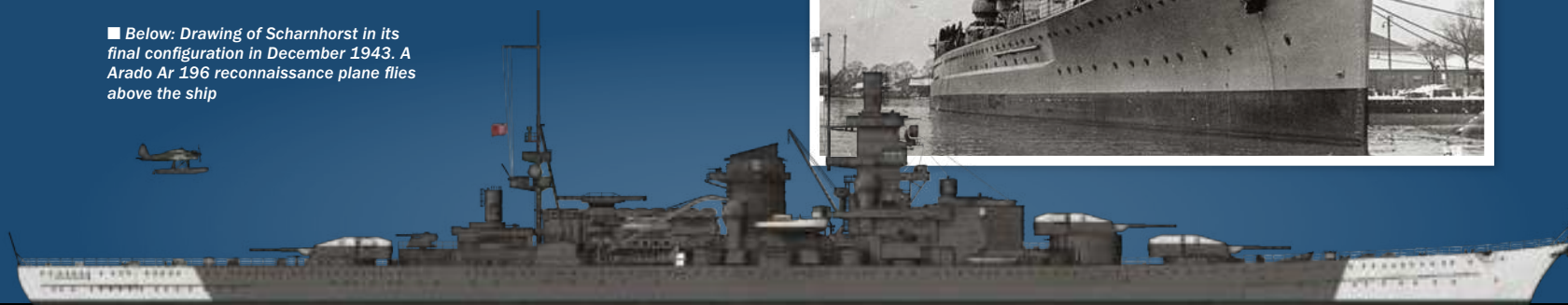
Duke of York opened fire at ten kilometres and after about 90 minutes of gunnery exchange, it became clear that Scharnhorst's speed was slowing. The final gun battle lasted for about an hour with the German ship finally losing power. Allegedly unsinkable from gunfire, it was finished off with torpedoes, 11 direct hits were registered. Although an Arctic 'fret' obscured the view, a terrific explosion confirmed the ship had gone.

Scharnhorst was claimed by the same ocean depths it had consigned so many other vessels to, sinking with the loss of all but 36 of 1,968. Scorpion rescued more than 30, who were taken back to Scapa Flow. In one fell-swoop, the worst remaining menace to the Arctic Convoys had gone. The following day, an ecstatic Churchill telegraphed Stalin with the news. The wreck of Scharnhorst was discovered in September 2000, lying upside down in approximately 290 metres of water.



■ German battleship Scharnhorst in harbour when first completed. Note the ship's badge mounted on its bow

■ Below: Drawing of Scharnhorst in its final configuration in December 1943. A Arado Ar 196 reconnaissance plane flies above the ship



“A FEW STARK NUMBERS DO NOT CONVEY THOUGH THE COURAGE OF THE MEN WHO FOUGHT THEIR WAY ACROSS THOSE INHOSPITABLE SEAS”



Faulty intelligence suggested the Tirpitz, Admiral Hipper and Admiral Scheer had left Trondheim to engage, and on 3 July, the Admiralty ordered its cruisers to turn west towards the perceived threat. The next day the convoy was ordered to ‘scatter’, a decision that saw two-thirds of its ships sunk by aircraft and U-boats, with the loss of nearly 100,000 tons of material and 153 merchant seamen. No British warships were lost. The abandonment of the convoy left a lasting mistrust within the merchant service, at a time when morale was already precarious. After this, summer convoys were suspended; Stalin was unimpressed.

The next convoy, PQ-18, did not sail until September, but still lost a third of 40 ships, ten to air attack. Among naval ratings and merchant seamen, there was now general agreement that the Arctic Convoys were the war’s worst naval ordeal. Some men remained forever traumatised. To try to cut losses, the winter of 1942 saw some single, unescorted merchantmen making the trip. Five out of 13 arrived in Murmansk.

Arrival was no party. The Kola Inlet, the fjord leading to the port, was likened to hell – if it was possible for hell to be that cold – with Luftwaffe attacks on Murmansk occurring almost daily. Russian hospitality was lukewarm, but as they could proffer, they were repaying with Russian lives.

Come the end of 1942, the coding changed, ‘JW’ an outbound convoy and ‘RA’ homebound. Losses fell dramatically, as, at last, the Royal Navy could deploy escort carriers and powerful anti-submarine and anti-aircraft defences. The Germans meanwhile, hard-pressed elsewhere, diverted resources and later lost their most potent capital ship, Scharnhorst. This ‘triple-whammy’ helped the Allies. The Arctic route lost some criticality as the US began delivering supplies to Russia via the Pacific and Persia.

Come the end, more than 4 million tons of supplies had arrived, everything from tanks, aircraft and trucks to tractors, telephone wire, railway engines and boots. The most important contribution, however, was political, as the Western Allies demonstrated commitment to Russia. A significant portion of Germany’s air and naval forces was also tied up.

The human cost? One could argue it was small compared to other battlefields; 18 warships and 87 merchantmen lost, with around 830 merchant seamen and almost 2,000 naval personnel.

A few stark numbers do not convey though the courage of the men who fought their way across those inhospitable seas; the worst journey in the world.

2013 saw the long overdue award of a campaign medal, the Arctic Star; sadly too late for many brave mariners.

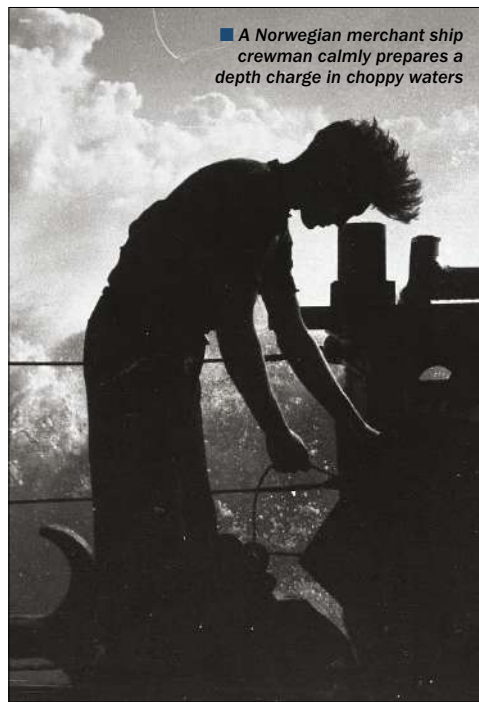


■ HMS Duke Of York ploughs though heavy seas whilst helping to guard convoy lanes to Russia

■ British Royal Navy ships passing through Arctic fog while on convoy duty in the Northern Waters, January 1945



■ A Norwegian merchant ship crewman calmly prepares a depth charge in choppy waters



■ The British destroyer HMS Faulkner laying down a smoke screen to obscure the convoy on its way to Russia



THE ALLIES STRIKE BACK

■ During 1941 the Battle of the Atlantic was far from decided, but U-boat dominance was slowly being eroded

**"GERMANY NEEDED TO SINK MORE
MERCHANT SHIPPING THAN THE MINIMUM
REQUIRED TO KEEP GREAT BRITAIN ALIVE"**

THE TIDE TURNS

THE YEAR 1941 SAW A GRADUAL REVERSAL OF GERMAN FORTUNES, THOUGH THE BATTLE WAS FAR FROM DECIDED



Success or failure in the Atlantic battle can in the simplest analysis be measured as a war of materiel: Germany needed to sink more merchant shipping than the minimum required to keep Great Britain alive, while the Allies needed to destroy

U-boats at a rate that outpaced German ability to replace them. During the first year of conflict, it appeared that there was little that could halt the Wehrmacht's ascending star. On land, Scandinavia and Western Europe had been conquered and the British military were either penned within their home country's island bastion, fighting Italian forces in North Africa or holding station in the Middle and Far East. At sea, despite the destruction of the cruiser Graf Spee, there was little to celebrate for the Allies. During 48 hours over the nights of 18 and 19 October 1940, U-boats in one of the first concentrated 'wolf pack' attacks sank 32 ships from two convoys in the Western Approaches for no loss to themselves. During the whole month of October, 60 ships were sunk and 12 damaged, though an average of only six U-boats were at sea at any given time.

Galvanised by this disastrous showing, Winston Churchill instigated a severe shake-up of the admiralty's efforts within the Atlantic. Following the Luftwaffe's failure to achieve air dominance over England, the threat of impending German invasion gradually receded; 'Operation Sealion' was postponed indefinitely on 17 September 1940 and German forces were released for action on other fronts shortly thereafter. This, in turn, released Royal Navy destroyers from invasion defence within the English Channel and made them available for convoy escort duties. Shipborne radar for the escorts was given top priority and anti-submarine warfare training stepped up. Meanwhile the admiralty was also instructed to establish a separate headquarters, purely for control of the Atlantic war.

Admiral Martin Dunbar-Nasmith was commander-in-chief, Plymouth, at the outbreak of war and responsible for the coordination and protection of shipping within the Western Approaches. Events showed that this arrangement was inadequate to deal with increasing scale of the Atlantic battle. Therefore, during February 1941, a new combined operations headquarters was

established in Liverpool. Admiral Sir Percy Noble was appointed commander-in-chief Western Approaches, coordinating Royal Navy and Air Force efforts to monitor U-boat movements and convoy routes using huge maps within the lower basement level of Liverpool's Derby House. Constantly updated with information 24-hours a day, this was to be the Atlantic convoy nerve centre and within Liverpool, escort group commanders, convoy commodores and ship masters all now shared the same port, allowing greater communication and coordination of effort. Evasive convoy routing was also established that re-routed shipping northward away from Luftwaffe bases in occupied France, but still drew the wolf packs after them.

AIR POWER

For Dönitz as BdU, aerial reconnaissance was essential but always suffered from a lack of training and resources as inter-service rivalry within the Third Reich bedevilled attempts at establishing a dedicated maritime air wing. The politically driven Luftwaffe chief Hermann Göring privately loathed Großadmiral Erich Raeder – and by extension the navy – as representing a 'bourgeois clique' that was at odds with the tenets of National Socialism. Göring jealously guarded control of Germany's air forces and only begrudgingly acquiesced to Hitler's orders for the formation of a maritime strike wing during early 1941, insisting all the while that it remain under Luftwaffe control. Correspondingly, despite some measure of success and a reputation that far outweighs results achieved within the Atlantic, this maritime squadron – Kampfgeschwader 40 (KG40) – remained an orphan of the Luftwaffe, always struggling for equipment and suitably trained crews. The result was that coordination between aircraft and U-boats was poor and never achieved the potential for which Dönitz had hoped.

On the British side, the squadrons of Coastal Command were also an early victim of the frosty relationship between the Royal Navy and Air Force. At the outbreak of war, it was the Royal Air Force's only maritime arm and was subsequently irrationally guarded against naval attempts to assume control. Royal Air Force doctrine placed emphasis on both Bomber and Fighter Command, and not

THE ALLIES STRIKE BACK

without justification did Coastal Command become known as the 'Cinderella service'. Underfunded and underequipped, it was unable to fully rise to the challenges of a rapidly expanding Atlantic war until the Royal Navy was finally given operational control in February 1941. Systematically starved of resources, it would take months before Coastal Command received the equipment it needed to tackle the U-boat onslaught; months in which Dönitz still appeared to hold the upper hand.

Nonetheless, as the year 1940 ended, the combination of slightly improved escort tactics, gradually increasing Coastal Command anti-submarine patrols and heavy winter weather resulted in fewer merchant losses. U-boats prowled further west than before in a bid to operate beyond British aircraft range, with corresponding difficulties in locating convoys further from known traffic 'choke points'. However, they maintained a steady toll of merchant ship sinkings which meant that by March 1941, the British government began predicting the collapse of Britain's war economy by the end of the following year. Hitler had finally declared a total blockade of the British Isles and the number of U-boats at sea was steadily increasing as German shipyard production rose.

However, a closer look at the statistics show that, despite increasing average numbers of U-boats on patrol, the tonnage they sank had not reached the heights of October 1940. Therefore, each U-boat was achieving less. The three 'Aces' lost in March certainly was a shock to U-boat morale and some of the most successful commanders were being rotated out of the front line to instruct the next wave of commanders and rest what were frequently frayed nerves. Other experienced U-boat captains were transferred to large 'cruiser' Type IX U-boats that began ranging further afield beyond the mid-Atlantic battleground. Many new commanders entering combat had started the war as first officers and were still of

■ An RAF Coastal Command Sunderland on convoy escort duty. It would be difficult to overstate the effect Allied aircraft had on the U-boats war



VERY LONG RANGE

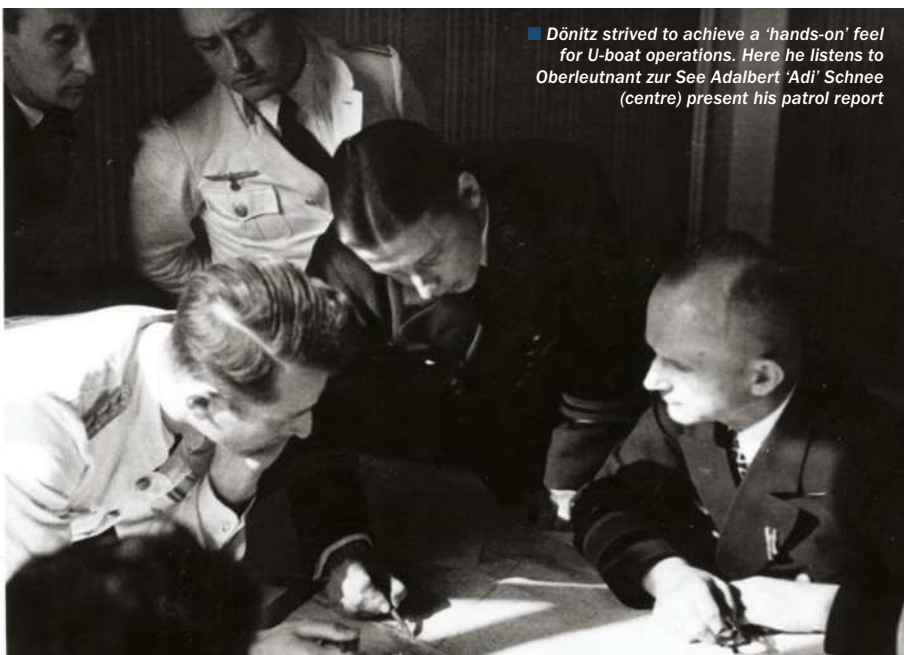
Improvements in Allied air power would become a defining factor in defeating the U-boats

Coastal Command showed considerable shortcomings at the outbreak of war, resulting from years of neglect by the Royal Air Force. They entered combat with only an ineffective 'anti-submarine bomb' and with only three operational Groups: No. 15 Group that moved from Plymouth to Stranraer in June 1940; No. 16 Group based in Kent; and No. 18 Group in Rosyth, covering the North Sea. The Royal Air Force had wrongly concluded that meagre U-boat strength meant that there was little chance of an assault on British trade routes and little work had been done regarding anti-submarine operations. Conditions improved upon the Royal Navy's assumption of control. Experiments with aerial depth charges took place in spring 1940, resulting in the Mark VII depth charge being carried by aircraft;

later improved with more powerful Torpex charges. Following an initial inability to find U-boat targets during sweeping patrols, tactics were improved and aircraft flew two distinct mission types. The first was primarily defensive and involved scouring established convoy routes as a distant escort. While thus engaged, aircraft could not only attack sighted U-boats but also forced any sighted U-boats to dive, limiting their speed and increasing the chances of them losing contact with the convoy. The second type was more offensively minded as they began hunting in obvious U-boat transit areas within the Bay of Biscay. The same principle of attacking 'choke points' that Dönitz had used against convoys was now turned on U-boats entering and exiting French harbours.

New aircraft-mounted weapons were developed and existing ones evolved as the war

progressed. Airborne radar became invaluable for detecting U-boats, as were the addition of Leigh-Lights allowing attacks to be made on surfaced boats at night. With darkness no longer a defence, another nail in the German coffin was the development of VLR (Very Long Range) aircraft that effectively closed the Mid-Atlantic gap that aircraft could not previously cover. With the Allied forces finally equipped with sufficient numbers of such aircraft during 1943, there was now no longer any haven for U-boats within the North Atlantic. German experiments with 'Flak Trap' U-boats and the 'Fight Back Order' of May 1943 were desperate attempts to counter this growing threat, but both failed. Despite considerable aircraft losses, air power was ultimately victorious, with over 250 U-boats sunk solely by aerial attack during the war.



■ Dönitz strived to achieve a 'hands-on' feel for U-boat operations. Here he listens to Oberleutnant zur See Adalbert 'Adi' Schnee (centre) present his patrol report



■ A Wren moves indicators on one of the large wall maps at the headquarters of commander-in-chief Western Approaches, Derby House, Liverpool

"DÖNITZ KNEW THAT THE BATTLE OF THE ATLANTIC WAS THE KEY TO GERMAN SUCCESS. THAT WAS WHERE HIS WAR WAS TO BE FOUGHT"

considerable experience, though the first batch of relatively inexperienced men also began to receive postings to the front. There they relied on taking part in pack operations to learn their trade alongside the last of the 'old guard'.

THE FIRST TURNING POINT

On 6 March 1941, Churchill issued a memorandum in which he famously wrote: "In view of various German statements, we must assume that the Battle of the Atlantic

has begun." Already, the tide was turning almost imperceptibly against Germany, with five U-boats and their highly experienced crews sunk that month. Most merchants torpedoed within the North Atlantic were unescorted, escort ships having reached their maximum range and returned to port while the convoy dispersed for the mid-Atlantic voyage. This practice ended when the Royal Navy and Royal Canadian Navy finally achieved complete trans-Atlantic escort during the middle of the year by basing Canadian forces on Newfoundland, while British ships covered the convoy in stages using Iceland as a refuelling point.

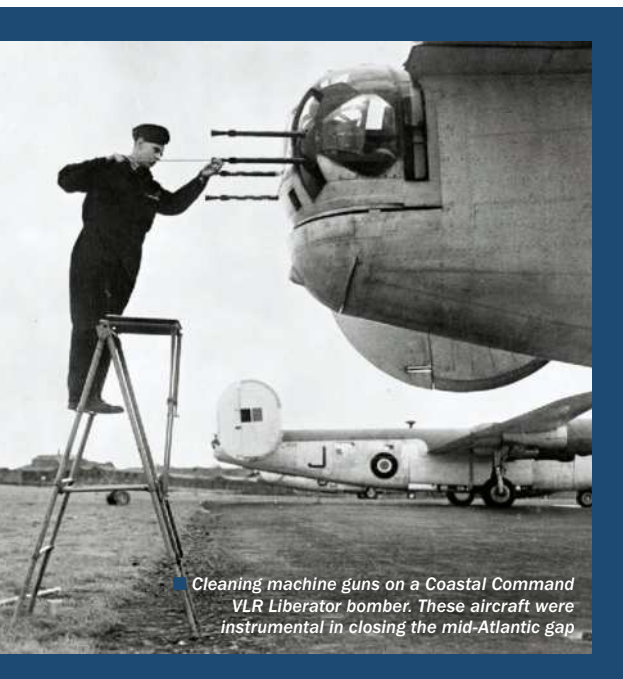
The calamitous German invasion of the Soviet Union in June 1941 released British air and naval forces into the Atlantic as the lingering threat of invasion was finally eliminated, while, correspondingly, Luftwaffe resources were diverted to the east. Within the Atlantic, although more U-boats were at sea than ever before, their detection of convoys and successful attacks diminished as the year progressed. Two major disasters for the Kriegsmarine also had immediate and lasting effects on Dönitz's campaign.

On 9 May 1941, one of the most significant events of the U-boat war occurred when U-110 was blown to the surface and captured after attacking convoy OB318 east of Cape Farewell, Greenland. Kapitänleutnant Fritz-Julius Lemp had made the second major error of his naval career as he ordered his boat abandoned, believing it was about to sink. Still intact were the boat's Enigma machine and secret documents that ordinarily were to be thrown overboard but had been left behind as the crew hastened to escape. However, behind them, their large Type IXB boat refused to sink. Seizing the opportunity, a British boarding party retrieved the discarded cipher machine and papers; apparently realising

his mistake, Lemp was shot as he attempted to return to his stricken boat. The intact Enigma was priceless to British intelligence, as were the accumulated documents and books; U-110 was scuttled to keep the event secret.

Months later, on 27 August, the Type VIII U-570 surrendered intact – though without secret material which had been ditched in a weighted bag – to a Royal Air Force 269 Squadron Hudson aircraft flying from Iceland. The captured boat was swiftly put through trials whereupon the British discovered that it could reach far greater depths than previously believed. Improved, deeper depth charges were soon available to the Royal Navy. Other new weaponry included the forward-throwing 'Hedgehog' multi-spigot mortar that fired 24 contact-fused projectiles ahead of an attacking escort ship. Newly developed Type 144 ASDIC sets were designed to specifically enable such 'forward attacks' allowing a U-boat contact to be held while fired upon, rather than contact lost during a depth-charge attack. Depth charges certainly produced greater 'shock and awe'; hedgehogs were less so as only a hit would cause them to explode. Nonetheless, the Allies' arsenal was expanding.

On the opposite side of the coin, major technological developments were not yet Dönitz's primary concern. Confidence in his men, machinery and codes remained thus far undiminished. Though perhaps a major strategic mistake, at a tactical level he pictured victory achieved through an almost mathematical simplicity: more U-boats meant more potential patrol lines, greater convoy contact, greater potential sinkings. He became exasperated by a trickling diversion of U-boat strength into the 'sideshow' of the Mediterranean Sea that began in September 1941. He knew that the Battle of the Atlantic was the key to German success. That was where his war was to be fought; that was where the war with Great Britain would be decided. The tide was already turning, but the end of 1941 would be truly catastrophic. On 11 December Germany declared war on the USA.



■ Cleaning machine guns on a Coastal Command VLR Liberator bomber. These aircraft were instrumental in closing the mid-Atlantic gap

ALLIED COMMANDERS

MEET THE MEN TASKED WITH ASSISTING THE ROYAL NAVY IN
STEMMING THE TIDE OF THE U-BOAT PERIL

LEONARD W MURRAY

The Canadian commander-in-chief

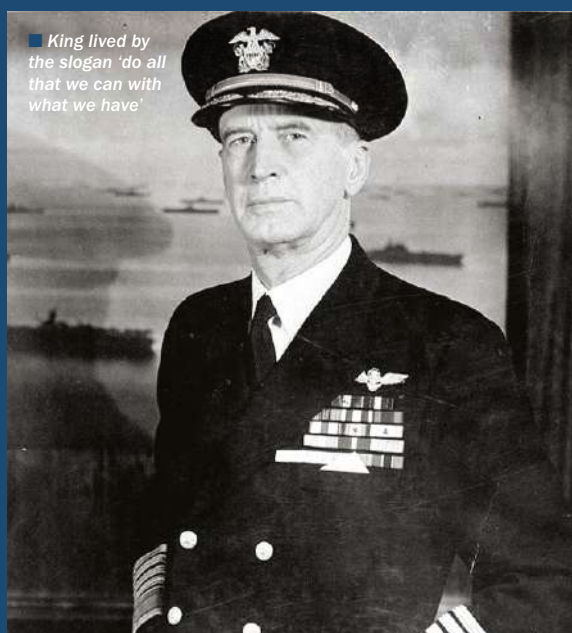
Years: 1896-1971 **Country:** Canada

Leonard W Murray played a huge role in the Battle of the Atlantic. He helped Canada's navy evolve from a fleet of only ten ships in 1939 to 332 vessels and the third largest Allied navy in 1945. Starting the war as deputy chief of naval staff, he later held the titles of commander of the Newfoundland Escort Force and then commander-in-chief of the North-West Atlantic. In a role often underappreciated in the annals of history, the Canadian Navy helped the Allied Atlantic supply lines to Britain to remain open even when the U-boat wolf packs were on the hunt. A former Royal Navy midshipman, Murray controlled movements from his command centre as he successfully navigated the precious convoys of Corvette-class ships across the hazardous Atlantic. He was a skilled tactician who was appreciated and respected both by his fellow officers and the men he commanded. He was also a talented motivator who managed to track down former Royal Navy officers across Canada and successfully coax them back into the fold.

Many of the men in the Canadian navy were inexperienced in this sort of warfare and it was Murray who ensured they were up to standard. In return, Murray had a huge admiration for his men, who braved the Atlantic crossings with rations that often consisted of just salted beef and tomato juice, the latter chosen specifically to avoid scurvy. During the war, Murray spent little time at sea, instead calling the shots from his desk as he dedicated himself to a minimum of 15 hours' work a day. He had a close relationship with the British admiralty and secretly visited the UK to request the construction of destroyers specifically for Canada. Under Murray's stewardship, the Canadian navy improved significantly and it was eventually responsible for almost half of all Allied convoy escorts in the Atlantic.



Murray was the only Canadian to command an entire Allied theatre of operations during either World War



King lived by the slogan 'do all that we can with what we have'

ERNEST J KING

A stubborn yet successful commander

Years: 1878-1956 **Country:** USA

Experienced seaman Ernest King had a prickly personality, but was nevertheless one of the leading US admirals in the war. The United States' key commander in the Atlantic was entrusted to deal with the U-boat threat prior to the USA's official involvement in World War II. He was initially hesitant to collaborate with the British, but eventually accepted their offer of convoy escorts in the Atlantic. At first King preferred anti-submarine patrols rather than a convoy system, but changed tack once the U-boat captains got wise to his rigidly scheduled patrols. King learnt from his mistake and with time his tactics ensured that the US coast became safe from the wolf packs. His eventual success in keeping American shores safe meant King was promoted to the dual roles of commander-in-chief of the US fleet and the chief of naval operations. He went on to lead the American offensive against the Japanese in the Pacific.

**"THE UNITED STATES' KEY COMMANDER IN THE ATLANTIC
WAS ENTRUSTED TO DEAL WITH THE U-BOAT THREAT"**

ROYAL EASON INGERSOLL

‘The silent force of sea power’

Years: 1883-1976 **Country:** USA

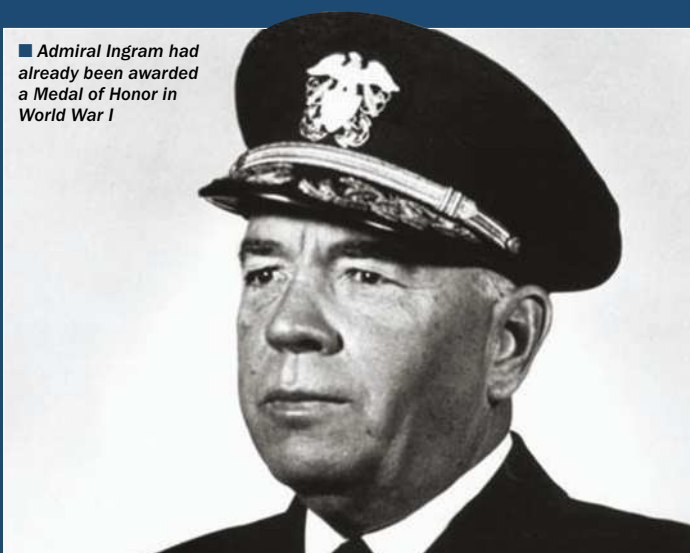
Royal Eason Ingersoll came into the war with a wealth of experience, having served in the US navy since 1905. As a vice-admiral, he commanded the US Atlantic Fleet for three years during the war. He was an expert organiser and after being promoted to admiral, he was put in charge of no fewer than 11,500 vessels across the Atlantic, with a responsibility to defend America’s Atlantic coastline. His logistical expertise helped keep the Kriegsmarine under wraps in both the North and the South Atlantic and maintained the steady flow of both troops and supplies that helped make landings like D-Day possible. Ingersoll’s contributions were critically important to the outcome of the Battle of the Atlantic and he was awarded the Distinguished Service Medal for his efforts. In his medal citation he was described as a ‘forceful and resolute leader’. His son also served in the war and was killed at the Battle of Midway.

“HIS LOGISTICAL EXPERTISE HELPED KEEP THE KRIEGSMARINE UNDER WRAPS”



■ Ingersoll’s family had a rich naval tradition, with his father serving in the US Civil War, Spanish-American War and World War I

■ Admiral Ingram had already been awarded a Medal of Honor in World War I



JONAS H INGRAM

A fearless former football player

Years: 1886-1952 **Country:** USA

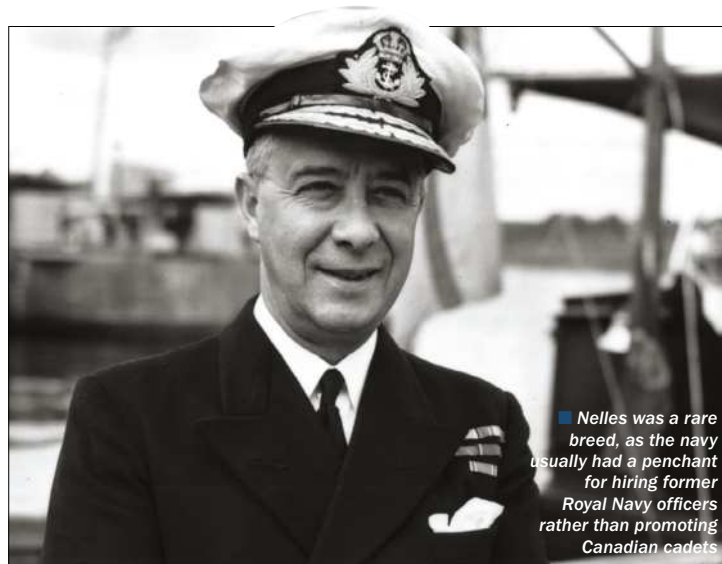
As commander-in-chief of the Atlantic Fleet from 1944 onwards, Ingram helped confirm the Allied victory against the U-boats. The admiral rose through the ranks during the war and was instrumental in sustaining the constant supply of troops across the Atlantic for landings in operations Torch and Overlord. Assuming power in the latter stages of the war, he provided the final blows to the depleted wolf packs. Ingram also had close relations with the Brazilian military and collaborated with them effectively to maintain Allied control in the South Atlantic. After the war he was presented with a gold star, in lieu of a second Distinguished Service Medal, for his service. The US navy destroyer USS Jonas Ingram was named after him and he was nicknamed the ‘one-armed admiral’ due to his motto, “I’d give my right arm to win this ball game.” The quote stemmed from his successful pre-war career as an American football player in the United States Naval Academy.

PERCY W NELLES

The Canadian navy’s first ever recruit

Years: 1892-1951 **Country:** Canada

Having been in the Canadian navy since its inception in 1910, Percy Walker Nelles was the ideal candidate to spearhead his country’s role in the Battle of the Atlantic. The long-standing chief of the naval staff wasn’t a brash dynamic leader like some and was instead a quiet man who was devoted to his work and to his country. After successfully navigating the navy through the worst of the Great Depression in the interwar years, Nelles got down to the task of developing a navy that in 1939 only had 3,604 men at its disposal. Thanks to Nelles, the navy was soon ready for war. His greatest contribution was coordinating the Canadian landings in France as he led the Canadian invasion force from London. His relocation to Britain came after a disagreement with naval minister Angus Lewis Macdonald over how significantly the navy should be expanded. After a 36-year naval career, he was bestowed the rank of admiral upon his retirement in 1945.



■ Nelles was a rare breed, as the navy usually had a penchant for hiring former Royal Navy officers rather than promoting Canadian cadets

HMS BELFAST

THIS POWERFUL REMINDER OF BRITAIN'S NAVAL MIGHT IN THE EARLY 20TH CENTURY HELPED SINK THE SCHARNHORST AND LED THE ALLIED NAVAL BOMBARDMENT ON D-DAY



MS Belfast is one of the finest surviving examples of a World War II battleship in existence and has an impressive history. It was launched on Saint Patrick's Day in 1938 by the wife of then-Prime Minister Neville Chamberlain, and was commissioned into the Royal Navy on 5 August 1939, almost exactly in time for the war. Belfast was the largest cruiser in the fleet, and was immediately called into

service patrolling northern waters. However, in November 1939, Belfast struck a mine in the Firth of Forth and the extensive damage took two and a half years to repair.

On rejoining the fleet in 1942, Belfast was newly equipped with advanced radar systems and played a crucial role in protecting Arctic convoys, most notably at the Battle of North Cape where it participated in the sinking of the German battleship Scharnhorst. In 1944, Belfast would have been the ship that transported Winston Churchill to the D-Day

landings, but King George VI prevented him from going. Belfast was among the first ships to open fire on 6 June and spent 33 days at Normandy, expending more than 5,000 shells.

After war's end, Belfast played an active role in Korea from 1950-52, working with other naval forces to support United Nations troops. The ship was later modernised for nuclear warfare before being decommissioned in 1963. Since 1971, Belfast has been a museum ship, and is permanently moored in London near Tower Bridge.

■ Located in the heart of central London HMS Belfast is a unique naval survivor from World War II and the Korean War



■ HMS Belfast bombarding German positions in Normandy, June 1944. The ship was one of the first Allied vessels to fire on D-Day at 5.27am



HMS BELFAST



MANUFACTURER: HARLAND AND WOLFF SHIPYARD
COMMISSIONED: 5 AUGUST 1939
LENGTH: 613.6 FEET (187.03 METRES)
BEAM: 69 FEET (21.03 METRES)
DRAUGHT: 19.9 FEET (6.07 METRES)
DISPLACEMENT: 11,175 TONS
SPEED: 32 KNOTS (37 MPH/ 59.5 KM/H)
POWERPLANT: 4 X OIL-FIRED, THREE-DRUM STEAM BOILERS POWERING FOUR PARSONS SINGLE REDUCTION GEARED STEAM TURBINES
ARMAMENT: 12 X 152MM MK XXIII GUNS, 16 X 40 MM TWO-POUNDER ANTI-AIRCRAFT CANNONS, 8 X 13MM ANTI-AIRCRAFT CANNONS
AIR ARM: 2 X SUPERMARINE WALRUS RECON BIPLANES
CREW: 850

“IN 1944, BELFAST WOULD HAVE BEEN THE SHIP THAT TRANSPORTED WINSTON CHURCHILL TO THE D-DAY LANDINGS, BUT KING GEORGE VI PREVENTED HIM FROM GOING”

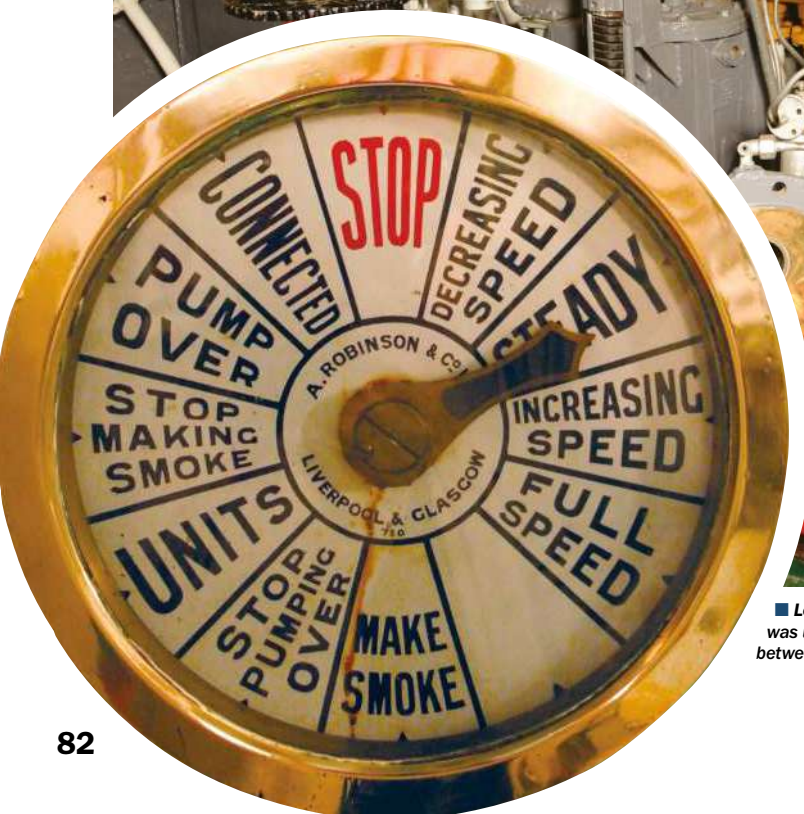
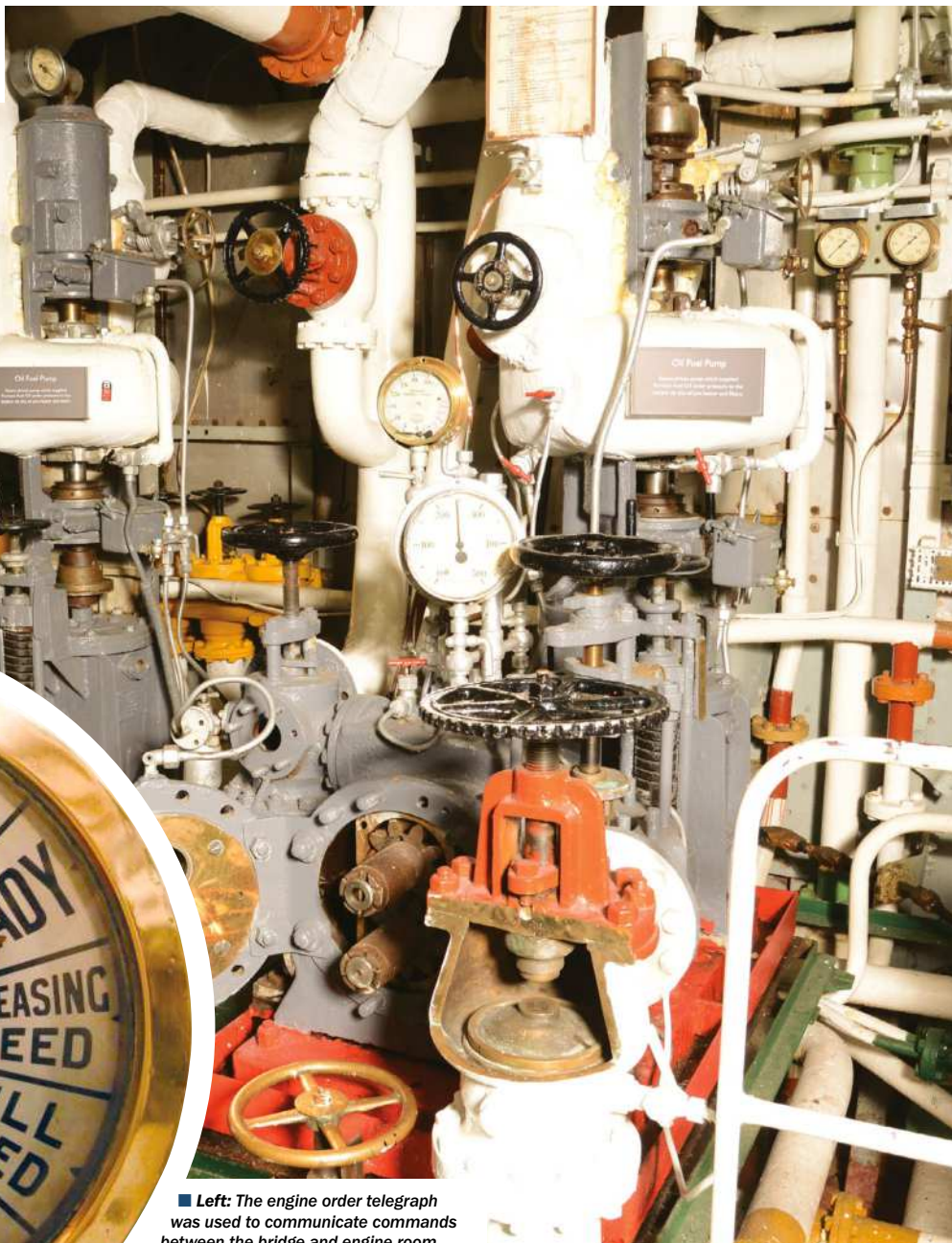


BOILER ROOM AND ENGINES

Belfast's stokers likened stepping into the boiler room to stepping into hell: the temperature ranged between 30-40 degrees Celsius. The complex machinery generated superheated steam at about 400 degrees Celsius to help power the engines. There are four boilers and fuel tanks carrying 2,200 tonnes of oil, and Belfast's four turbine engines rely on unit-propulsion. Each engine has four turbines for pressure, cruising and reversing, and were operated by university-educated artificers. When all four engines were working together, the ship would get through two to three tonnes of oil per hour but this would increase to 26 to 29 tonnes per hour at the full speed of 32 knots.

■ **Right:** During the 1950s modernisation refit, a panel was installed so that the boilers could be manned from the engine room, thus giving the artificers more control

■ The working temperatures in the vast labyrinths of the boiler rooms could be extreme, between 30-40 degrees Celsius. Stokers were constantly supplied with lemonade and salt tablets to prevent dehydration



■ **Left:** The engine order telegraph was used to communicate commands between the bridge and engine room

■ The forward triple turrets of HMS Belfast. Combined with the men in the shell and cordite rooms below, it could take up to 50 men to control one turret

“LOADING AND FIRING ONE GUN CAN TAKE LESS THAN TEN SECONDS AND THE RATE OF FIREPOWER IS EIGHT ROUNDS PER MINUTE”

■ Each shell weighed 50 kilograms, which the admiralty said was the largest that a man could lift by hand

■ Nine men worked in the shell room, and in heavy action could get 30 rounds of ammunition up to the guns per minute

ARMAMENT

Belfast has multiple triple gun turrets with each one containing a crew of 27. There would be seven men around the breaches, a turret captain, observer, sight-setter, gun trainer, ordnance suppliers and mechanics. The middle barrel in each turret would be set slightly behind the other barrels so that shells wouldn't interfere with each other in flight. Loading and firing one gun could take less than ten seconds and the rate of firepower is eight rounds per-minute. The guns were supplied from shell rooms directly below the turrets. Each room held 600 rounds of ammunition, equating to 2,400 rounds for the whole ship and 200 rounds per gun.



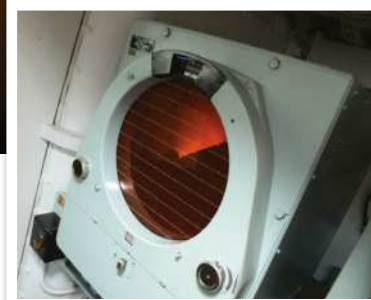
■ Left: HMS Belfast fires a salvo against enemy troop concentrations on the west coast of Korea in March 1951. The Korean War was the last time Belfast fired its guns on active service





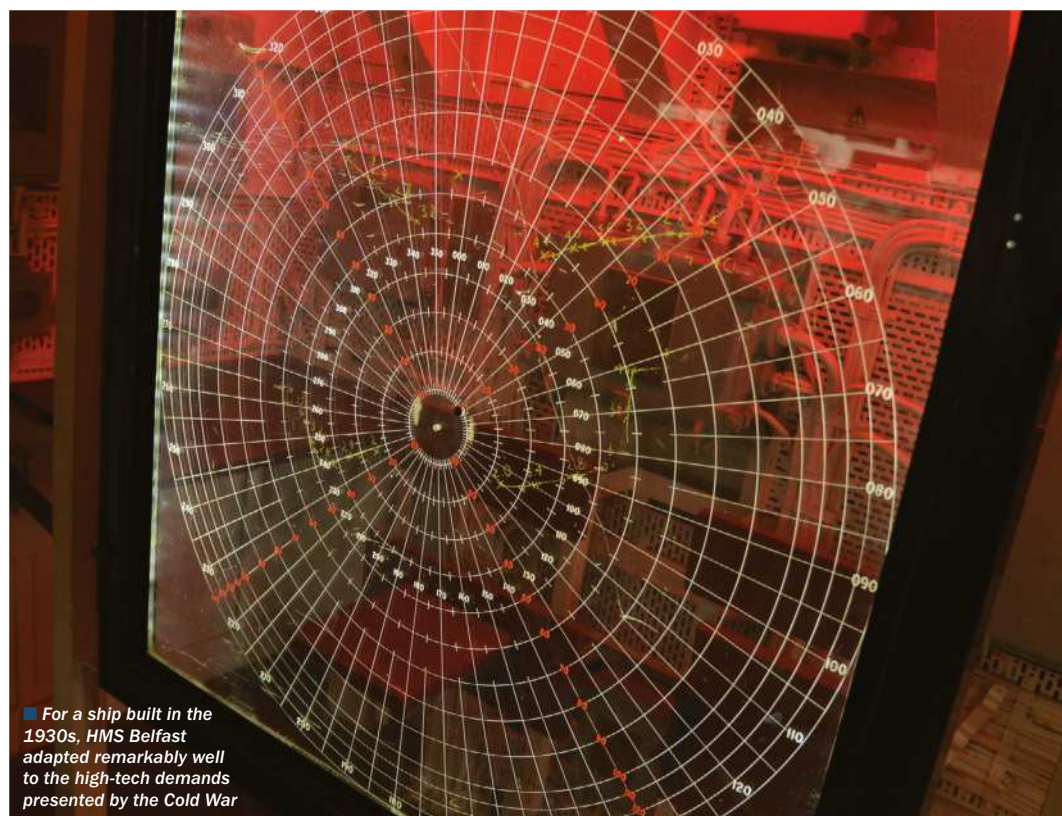
■ The enclosed bridge was designed to protect the captain in an age of nuclear warfare. It also contains the ship's strikingly mounted main compass (centre)

■ Below: By the 1950s, radar was replacing eyes as the main naval sighting device, which enabled the bridge to be enclosed with a reduced viewing platform



BRIDGE

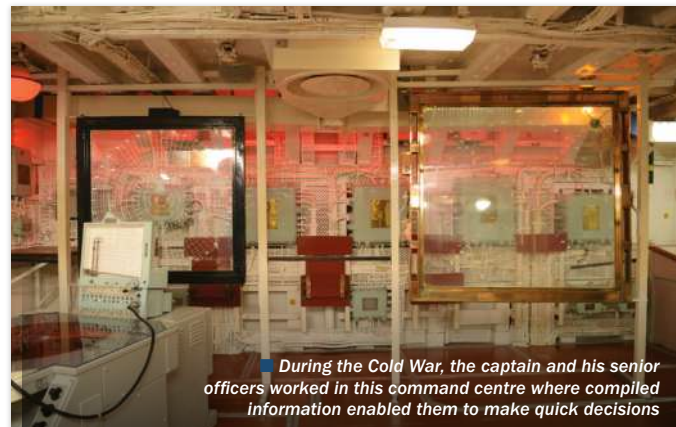
Before the refit of 1956-59, Belfast's bridge was open air, but the captain was moved inside with the advent of nuclear warfare. This is a bridge designed for the Cold War and is positioned at the highest possible level. It also doubles as the main compass platform. Previously, the captain needed a 360-degree view of the surrounding area, but by the 1950s, radar was doing most of the work, enabling the windows to only face forward, port and starboard. There is also no helm as it is stationed in the bottom of the hull. This was so the ship could keep steering if it came under attack.



■ For a ship built in the 1930s, HMS Belfast adapted remarkably well to the high-tech demands presented by the Cold War

INFORMATION AND TRANSMITTING STATIONS

After 1959, Belfast was a recognisably modern warship. The captain and his main officers would be located in the action information office to act on targets picked up by radar and the direction control tower. The captain could make an informed decision in one spot based on data from readers, chart tables and repeaters. In the transmitting station, there is a mechanical computer from World War II that predates the refit. Exclusively operated by Marines, the computer made calculations about air pressure, wind speed, drift and targets in order to aim and elevate Belfast's guns at precise angles.



■ During the Cold War, the captain and his senior officers worked in this command centre where compiled information enabled them to make quick decisions



■ Belfast contains a World War II computer (centre) that calculated the firing angles for the guns. Remarkably, the technology for these machines actually dates back to World War I



■ Belfast was equipped with two Supermarine Walrus amphibious biplanes that were used to attack submarines. They were launched by catapult and had hangars to store them



■ A two-pounder anti-aircraft gun aboard HMCS Assiniboine, escorting a troop convoy en route from Halifax to Britain, 10 July 1940

CANADA'S RACE ACROSS THE SEAS

FROM THE FIRST WEEKS OF WWII, CANADA FOUGHT TIRELESSLY AT BRITAIN'S SIDE IN THE FIGHT FOR THE ATLANTIC



Without the major contributions of Britain's allies in WWII, it is highly probable that Germany would have defeated the stout, defiant island determined to fight on despite the odds stacked against it. Canada proved to be one of Britain's

most important friends in a time when most had fallen to the Wehrmacht's sword.

Canada declared war on Germany on 10 September 1939 – a week after Britain – and immediately committed men and resources to the fight against Hitler's forces. The country's primary role in the conflict was rapidly established as helping to protect the ships transporting supplies to Britain. It was a task that Canada more than matched, despite the ferocity of the U-boat onslaught that would claim so many Allied lives.

At the start of the war, the Royal Canadian Navy only possessed 13 vessels and employed around 3,500 seamen. But war has a way of boosting productivity, and by the end of the bloodshed Canada boasted 373 ships and over 90,000 men. As early as 16 September 1939 these brave sailors began to play their part, the RCN destroyers St Laurent and Saguenay defending the first convoy – known as HX-1 – as it set sail from Halifax, bound for Britain.

Convoys of this nature began to mass in ports at Halifax and Sydney, Nova Scotia on a regular basis as they prepared to sail across the treacherous Atlantic, fed by ships harboured in ports such as St John's in Newfoundland. In the early years, these convoys would suffer terribly at the hands of Germany's navy, and particularly its U-boats.

Many of the attacks that devastated Allied shipping in the first half of the war occurred in

what became appropriately known as the 'Black Pit'. This apocalyptic name applied to a stretch of the Atlantic beyond the range of Allied aircraft. Without aerial assistance, merchant ships could only rely on the battleships at their side as they raced across an ocean teeming with enemy submarines.

An example of the fate that befell many convoys occurred on 18 October 1940, when a U-boat wolf pack pounced on convoy SC-7, sailing from Sydney, Nova Scotia to Liverpool. Of the 35 merchant ships and six escorts that comprised this Allied fleet, the U-boats sank 20 in a three-day battle, killing 140 sailors in the process. Such losses contributed to an utterly dire situation for the Allies in which they lost ships in such vast numbers that they initially could not be replaced.

One solution to the growing problem was the corvette boat. Part of Canada's huge

shipbuilding efforts, these small, speedy and inexpensive boats (originally used to patrol Canada's coastal waters) proved invaluable. Despite ranging from 59 to 77 metres in length and being most often equipped with a single machine gun and depth charges, the corvette enabled the Canadian navy to ship valuable materials, equipment, food and soldiers to British shores.

As well as warships, these convoys were defended by the Royal Canadian Air Force. Founded in 1920 and given the royal title in 1924 by King George V, the RCAF began the war with only 29 fighting aircraft. However, it would rapidly develop alongside the navy, reaching a peak of 215,000 personnel by the war's end and standing as the fourth-largest Allied air force, credited with sinking 19 U-boats. RCAF crews piloting British planes alone would account for the sinking of 200 German submarines.

U-BOATS IN CANADA

Canada's role in WWII grew as the conflict progressed. Initially, four Canadian destroyers were dispatched to the English Channel in an

effort to help defend Britain. But by February 1941, following an agreement between the US and Britain that saw 50 old US destroyers transferred to the Royal Navy, of which Canada acquired six, the number of RCN destroyers guarding Britain reached ten. But Canada would also need to fight in its own waters.

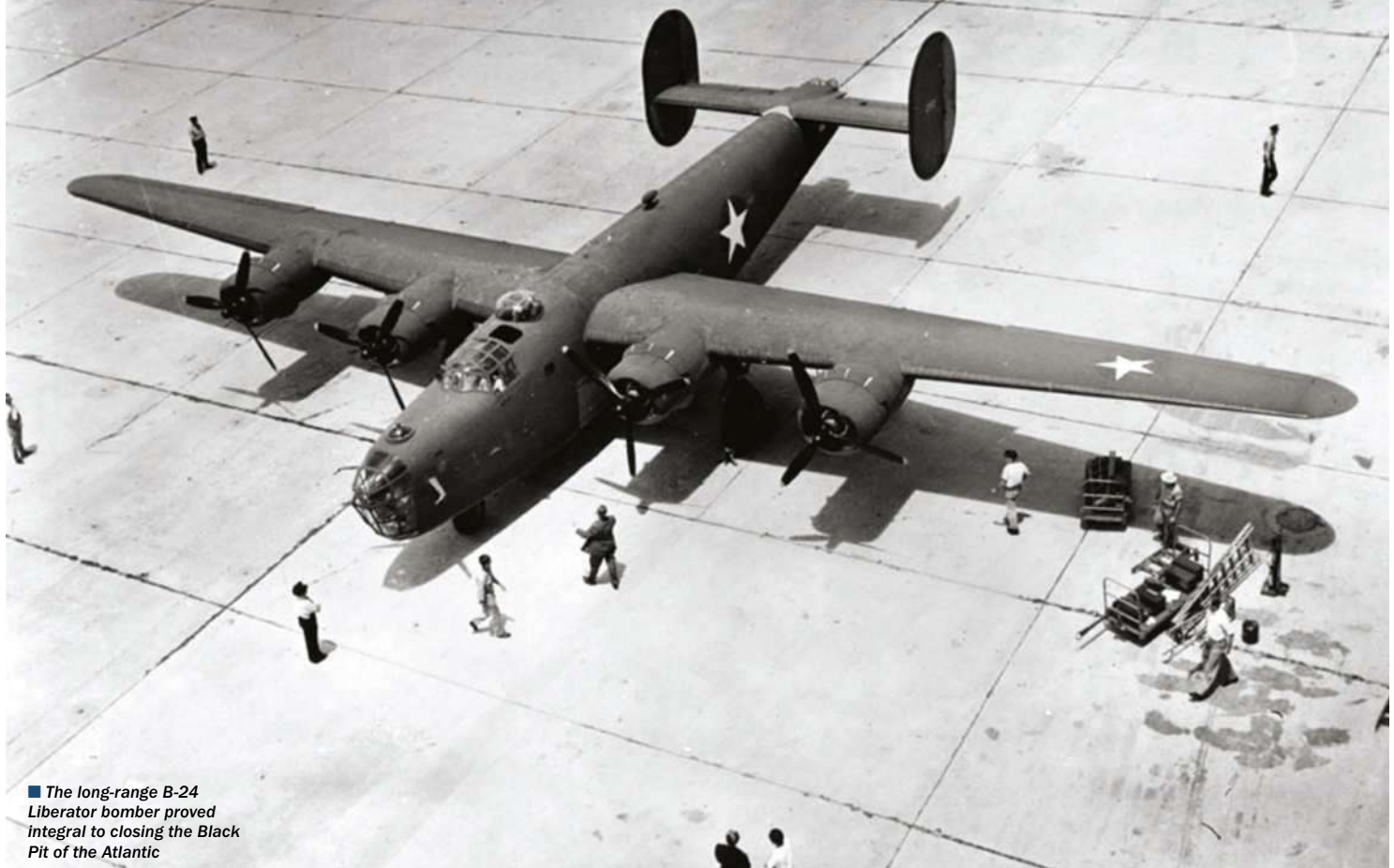
Buoyed by its rampant early success in the battle for the Atlantic, Germany embarked on a hugely ambitious and ultimately successful operation. In May 1942, as part of a wider assault on both the US and Canadian coastlines, U-boats entered the Gulf of St Lawrence and the inland waters of the St Lawrence River. In a series of engagements between May and October of that year (and later in September 1943 and the winter of 1944) that would become known as the Battle of the St Lawrence, U-boats sank 23 Canadian ships.

U-553 launched the first attack on 12 May, torpedoing the British freighter *Nicoya* before training its sights on the Dutch vessel *Leto*. This was followed by another raid in July by U-132 that resulted in the sinking of three ships in a 12-ship convoy before depth charges damaged the submarine, forcing

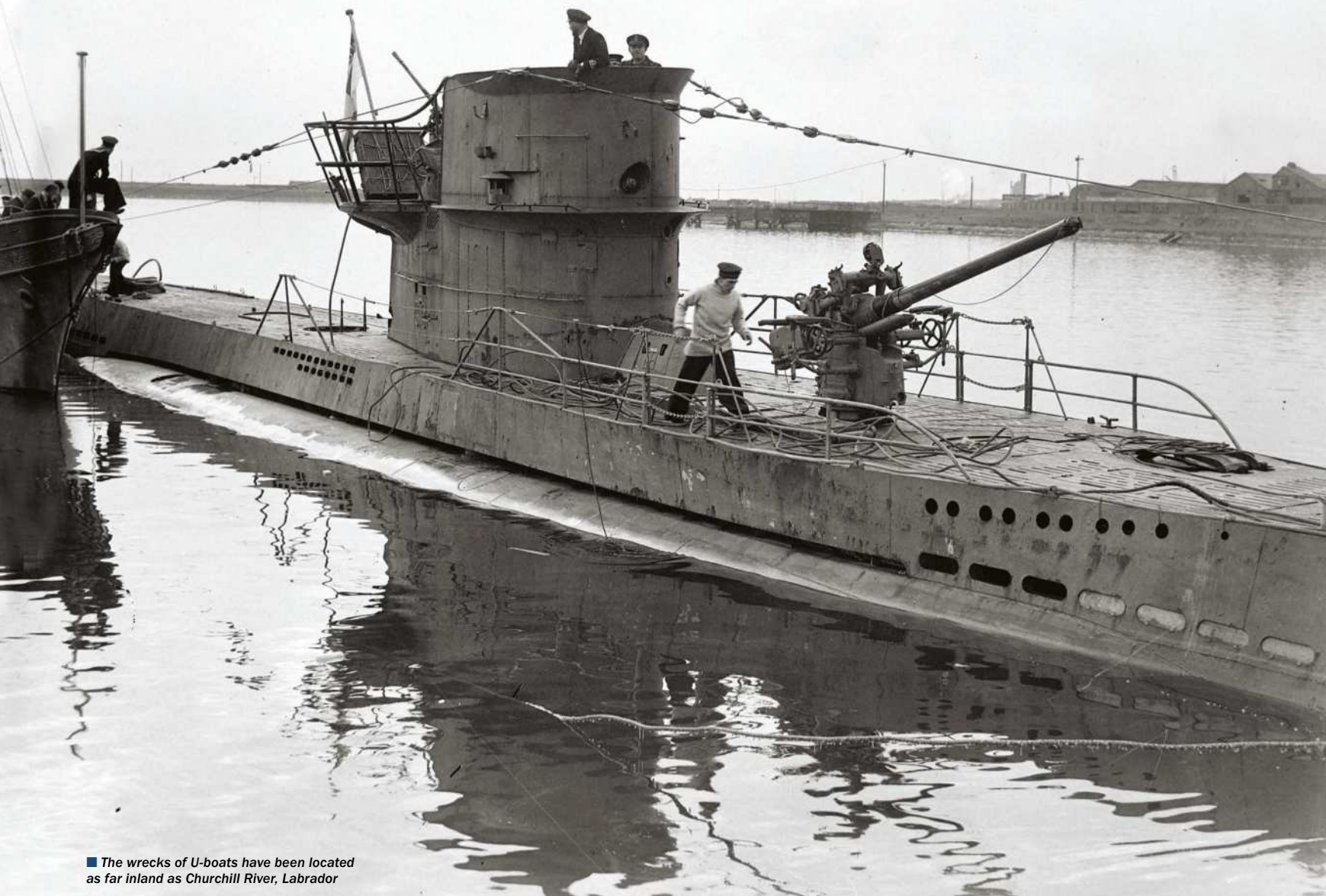


■ Admiral Karl Dönitz's fleet enjoyed huge success in the first half of WWII before new Allied tactics curtailed its progress

"IN A SERIES OF ENGAGEMENTS BETWEEN MAY AND OCTOBER 1942 (AND LATER IN SEPTEMBER 1943 AND THE WINTER OF 1944) THAT WOULD BECOME KNOWN AS THE BATTLE OF THE ST LAWRENCE, U-BOATS SANK 23 CANADIAN SHIPS"



■ The long-range B-24 Liberator bomber proved integral to closing the Black Pit of the Atlantic



■ The wrecks of U-boats have been located as far inland as Churchill River, Labrador

it to retreat. Further attacks in August and September led to the closure of the St Lawrence River and the Gulf of St Lawrence to all trans-Atlantic shipping, an embargo that lasted until 1944.

These clashes were the first time since the War of 1812 that Canada had been forced to fight in its own waters. The initial failure to repel the U-boats led to a political crisis that saw many influential figures calling for the recall of Canada's ships to defend its shores, instead of protecting the Atlantic convoys. Fortunately for the Allied cause, Canadian vessels continued to escort convoys to Britain, North Africa and the Soviet Union.

Like its navy, Canada's merchant fleet was incredibly small at the beginning of the war, with fewer than 40 vessels. Despite its early limitations, the 12,000 men and women aboard its ships, which grew in number to 400 by the end of the war, would go on to complete over 25,000 successful voyages. Their cargo helped fuel the war effort by supplying the equipment, materials and food. But the merchant sailors would pay a high price for their bravery, with 59 ships lost and one in seven who served perishing in the push to keep Britain in the war.

Another critical contribution was Canada's role in establishing the pattern of war in the

Atlantic. Prior to the U-boat attacks in the St Lawrence, Canada's naval division had operated a network of shipping agents in the neutral United States that helped to control British shipping in North America. Canada's capital city, Ottawa, also made a significant impact by supplying the United States navy with their studies on trade movements from 1941. It was a role performed so effectively that the city was tasked with controlling shipping for a large swathe of the Atlantic north of the equator.

CLOSING THE GAP

These gigantic responsibilities took their toll on the RCN, and along with the relentless approaches of the U-boats, Canada was pushed to breaking point. Even though

the embarkation site for the convoys was transferred from Newfoundland to New York, Canadian ships had to escort the merchant ships on their run to the Hudson in the face of continued assaults from U-boats. Fortunately for the Allies, 1943 proved to be a turning point.

The advent of new long-range aircraft, primarily the US-built Consolidated B-24 Liberator, allowed the Allies to close the Mid-Atlantic gap (the Black Pit). These heavy bombers, equipped with a range of machine gun turrets, proved invaluable in defending the convoys from the skies.

The Royal Navy supplemented this new type of defence by establishing elite hunting groups tasked with seeking out and destroying U-boats. Along with the bombers, this allowed Canada to expand its escort role and send

"THEIR CARGO HELPED FUEL THE WAR EFFORT... BUT THE MERCHANT SAILORS WOULD PAY A HIGH PRICE FOR THEIR BRAVERY, WITH 59 SHIPS LOST AND ONE IN SEVEN WHO SERVED PERISHING IN THE PUSH TO KEEP BRITAIN IN THE WAR"

Canadian troops were transported across the Atlantic to play a major part in the invasion of Sicily, fighting to establish a platform for the march into Italy



ships to defend British ports. Canada also followed the British example in forming its own hunting groups, helping to turn the tide against the Kriegsmarine. Between November 1943 and the spring of 1944, Canadian ships sank eight U-boats.

The appointment of Rear Admiral Leonard Murray as commander-in-chief, Canadian Northwest Atlantic in 1943 was also pivotal. Previously charged with leading the Newfoundland Escort Force (NEF), Murray expertly directed convoy battles from Halifax in his new role, the only Canadian to command an Allied theatre throughout the war. In July of the same year, Canadian troops supported in the invasion of Sicily, helping to force the Axis powers off the island in 38 days and lay the foundations for the invasion of Italy. And things would only get worse for Hitler's forces.

As Germany began to enjoy far less success at sea, Admiral Dönitz – who lost his youngest son in a U-boat sinking – began to pull his forces out of the North Atlantic in 1943. At the insistence of Hitler, Dönitz later reintroduced them, only to see one German submarine sunk for every ship they attacked. This rate of attrition quickly resulted in a permanent German withdrawal from the area. This critical step made the military build-up for D-Day a

possibility, an event that Canada would play a huge part in.

Prior to the Normandy landings, Canada was given control of the English Channel. On the fateful morning of 6 June 1944, 50 RCN ships covered the flanks of the British, American and Canadian troops headed for the French coast. The main purpose of their presence was to ensure that the U-boats could not spring an attack on the invasion fleet as it headed across the Channel. It proved to be a successful operation as the Allies reached the shores of Normandy and fought to establish a beachhead. The springboard for the invasion of Nazi-occupied Europe was in place. Defeat for Germany was now a matter of time.

SACRIFICE AT SEA

Victory in the Battle of the Atlantic, and ultimately the war, was a triumph of courage and cooperation. Canada's sacrifices were crucial to the outcome. Many of the 2,000 RCN seamen who died during WWII perished in the Battle of the Atlantic, along with 752 members of the RCAF. Without the commitment of Britain's North American ally, Britain would have faced an almost impossible task just to survive, let alone wage a war.

ADMIRAL LEONARD MURRAY

The rise of the man who would command Canada's navy in WWII

Leonard Warren Murray was born at Granton, Nova Scotia on 22 June 1896. The descendant of Scottish immigrants on his father's side, Murray's childhood near the waters of Pictou Landing was a portent of the glittering future that awaited him. At just 14 years of age he left school to enrol in the first intake of recruits at the newly created Royal Navy College of Canada in Halifax. Within just a few years he would see action.

At the outbreak of WWI, Murray was assigned to protect the Canadian Royal Navy's largest vessel at the time, HMCS Niobe. Murray proved to be an able young seaman, later serving as flotilla gunnery officer aboard HMCS Margaret before a promotion to sub-lieutenant while on HMCS Rainbow. But it was his time spent aboard HMS Leviathan in the final two years of WWI that would later prove crucial. As assistant navigating officer he was charged with establishing troop convoys that would cross the Atlantic in an effort to outmanoeuvre the German U-boats, ideal preparation for the coming fight against Nazi Germany in WWII.

With war declared on Hitler's forces in September 1939, Murray was swiftly appointed deputy chief of the naval staff. He quickly became the driving force behind the bolstering of the RCN's ship numbers, and even traversed Canada to recruit ex-Royal Navy officers.

A brief spell commanding five Canadian warships sent to Britain for convoy duties followed, but Murray was swiftly brought back and placed in charge of the Newfoundland Escort Force (NEF) in June 1941. He was now responsible for a fleet of Canadian and British destroyers and 21 corvettes, tasked with conducting escort runs from New York out as far as the south of Iceland.

But his crowning moment came on 1 April 1943 with his appointment as commander-in-chief Canadian Northwest Atlantic, making him the only Canadian throughout the entire war to command an Allied theatre. He led it with aplomb and, with Germany on the back foot, oversaw the safe arrival to Britain of the war's biggest convoy in August 1944 – 167 merchant ships carrying 1.5 million tons of supplies. Right up until Germany's defeat, Murray provided the cool head required for the mighty task of ensuring the Allied convoys cross the Atlantic intact.



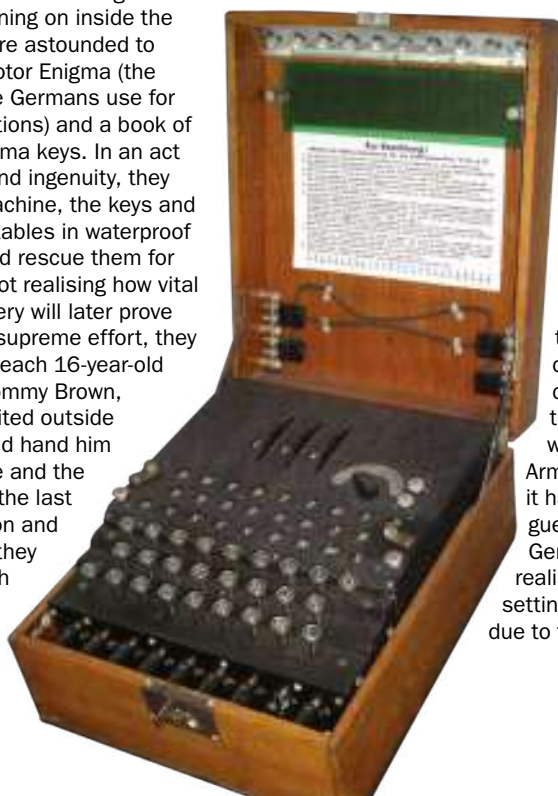
CRACKING ENIGMA

DISCOVER HOW THE MEN AND WOMEN OF BLETCHLEY PARK DECIPHERED THE 'UNBREAKABLE' GERMAN ENIGMA AND HELPED DEFEAT HITLER'S NAZIS



It's February 1942; the carnage of World War II shows no signs of stopping and the balance of world power is precariously poised. Night is about to fall on the Atlantic Ocean and as darkness comes the water is inky-black and icy. In the depths of seas around the world, German U-boats cruise like predators stalking their prey. They lie in wait, patiently waiting their turn to pounce; brazenly, some even encircle convoys, sailing invisibly around them. On this night, one U-boat fires off its torpedoes and an American convoy ship is engulfed in bright flames that light up the sky. The crew on this convoy know they will perish in this icy sea and that the vital supplies and provisions they are carrying across the Atlantic to Britain will also be lost. As screams and shouts finally give way to an eerie silence, its neighbours can only watch helplessly, fearing their turn may soon come. The deadly wolf pack have claimed another victim. The Allies are virtually defenceless against them, knowing only that these deadly ships will strike again, but not where or when.

As the year draws to a close a German U-boat, the U-559, is spotted off the coast of Palestine by HMS Petard and subsequently depth-charged. This time it is the U-boat crew who know that all is lost: their vessel is sinking and they must abandon ship. Lieutenant Anthony Fasson, Able Seaman Colin Grazier and Tommy Brown swim out to it, even though the boat is rapidly sinking below the waves. Seeing some lights remaining on inside the boat, they are astounded to find a four-rotor Enigma (the machine the Germans use for communications) and a book of current Enigma keys. In an act of bravery and ingenuity, they wrap the machine, the keys and the bigram tables in waterproof material, and rescue them for the Allies, not realising how vital their discovery will later prove to be. With supreme effort, they manage to reach 16-year-old Naafi boy Tommy Brown, who has waited outside the boat, and hand him the machine and the books. It is the last act of Fasson and Grazier, for they go down with U-559 as it sinks.

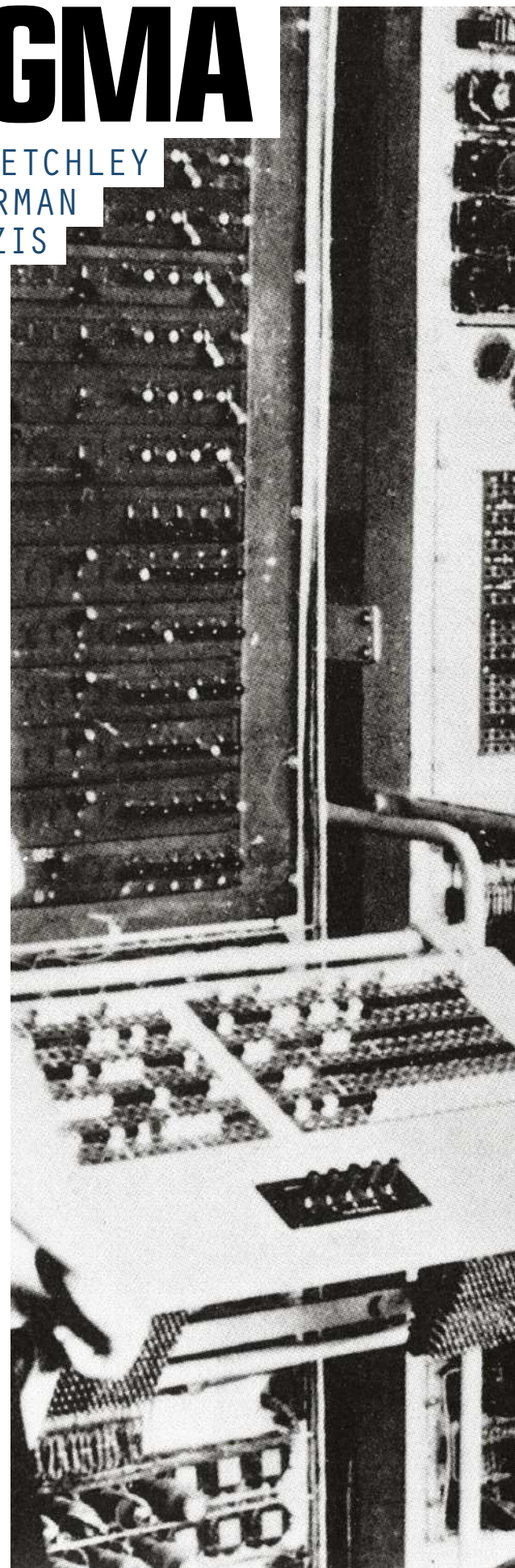


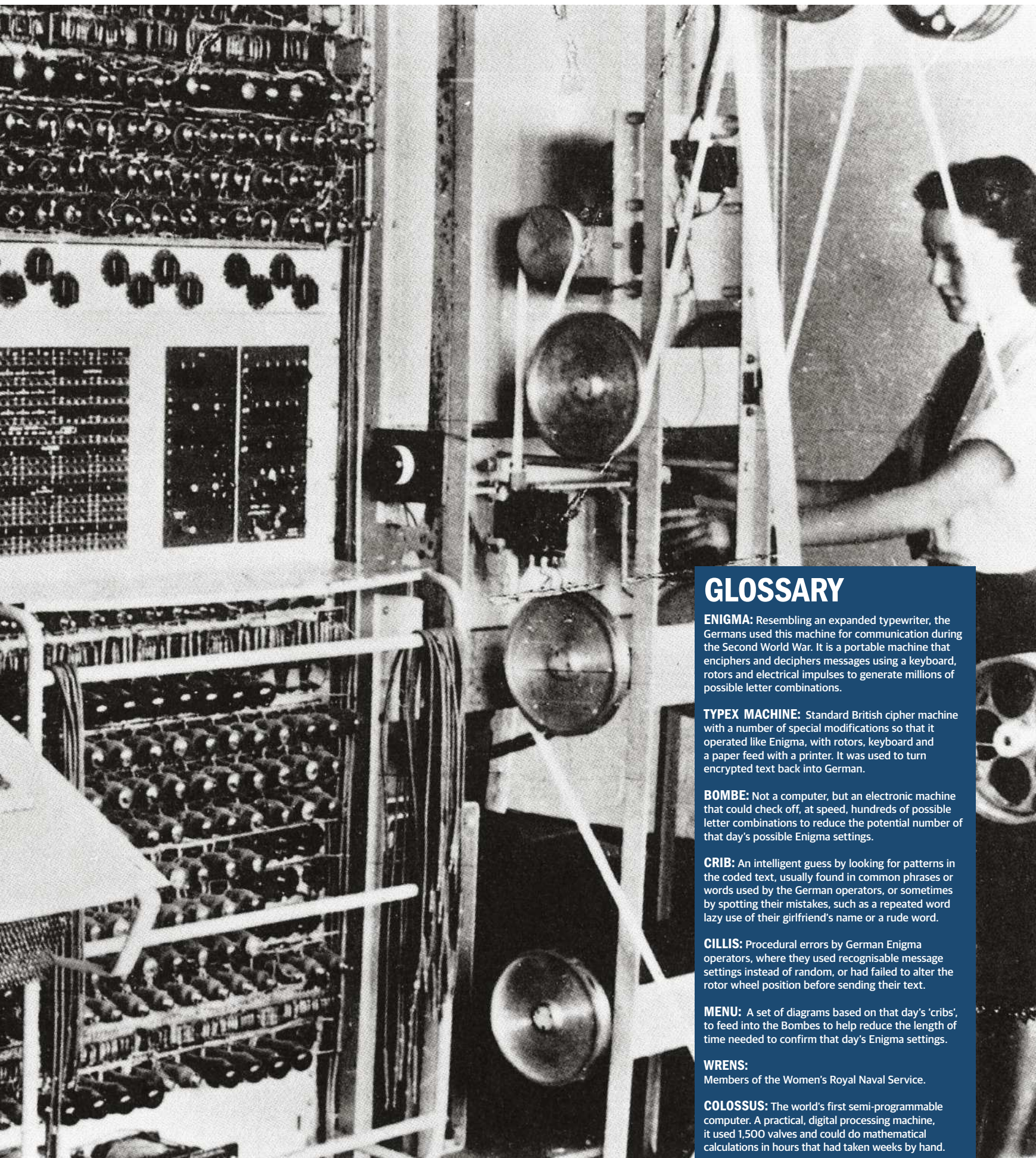
They are both posthumously awarded the George Cross.

This treasure – for that is what it was to the British codebreakers – made its way to Bletchley Park, a country house in rural Buckinghamshire that had been set up as Intelligence Headquarters at the start of the war. Those based there knew they now had a chance to get back into breaking the German naval codes, codenamed 'Shark', and affect the outcome of World War II. An eccentric young mathematician named Alan Turing would have a key role to play in breaking the Nazi code.

Born in 1912, Turing came to Bletchley from Cambridge, aged 27, the day after Britain declared war on Germany. His clothes were dishevelled, at best; others thought he often dressed like a tramp. When excited over some problem or idea, he would stutter with his eagerness to express his legion of ideas. He would often be seen riding his bicycle around the Bletchley countryside, wearing a gas mask to avoid the pollen that set off his hay fever. In his office, he would chain his coffee mug to the radiator so no one else would take it. With little faith in banking and currency during wartime, he put his money into silver bars which he then buried, intending to dig them up after the war – not realising that by the time he had followed his own elaborate set of instructions for finding them, a new town called Milton Keynes was being built over the countryside. To the onlooker, Alan Turing totally fitted the bill of a typical, eccentric, academic boffin; to his colleagues, themselves some of the brightest minds in the country, he was a true genius of his time.

The Allies knew the Germans were using a machine named Enigma and teams of codebreakers at Bletchley were trying to crack the code this machine used. The teams worked in newly constructed prefabricated huts, each given a number instead of a name for secrecy. In Hut 8 they were concentrating on cracking the German Naval ciphers. They already knew that Naval Enigma operators were more careful than Army operators, thus making it harder to use educated guesses, or 'cribs', to spot German mistakes. But now they realised the number of possible settings were hugely expanded, due to the increase in code wheels





GLOSSARY

ENIGMA: Resembling an expanded typewriter, the Germans used this machine for communication during the Second World War. It is a portable machine that enciphers and deciphers messages using a keyboard, rotors and electrical impulses to generate millions of possible letter combinations.

TYPEX MACHINE: Standard British cipher machine with a number of special modifications so that it operated like Enigma, with rotors, keyboard and a paper feed with a printer. It was used to turn encrypted text back into German.

BOMBE: Not a computer, but an electronic machine that could check off, at speed, hundreds of possible letter combinations to reduce the potential number of that day's possible Enigma settings.

CRIB: An intelligent guess by looking for patterns in the coded text, usually found in common phrases or words used by the German operators, or sometimes by spotting their mistakes, such as a repeated word or lazy use of their girlfriend's name or a rude word.

CILLIS: Procedural errors by German Enigma operators, where they used recognisable message settings instead of random, or had failed to alter the rotor wheel position before sending their text.

MENU: A set of diagrams based on that day's 'cribs', to feed into the Bombes to help reduce the length of time needed to confirm that day's Enigma settings.

WRENS: Members of the Women's Royal Naval Service.

COLOSSUS: The world's first semi-programmable computer. A practical, digital processing machine, it used 1,500 valves and could do mathematical calculations in hours that had taken weeks by hand.

THE 'UNBREAKABLE' ENIGMA

Discover the main devices on the complicated and portable German communications machine

ROTORS

The standard Enigma had three rotors, the advanced machine had four. These scrambled messages into unintelligible cipher text. Each rotor had numbered ring scales for each of the German Armed Forces and the rotors could be changed daily. The settings were changed at midnight and each rotor could be set to any one of 26 different ring settings.

KEYBOARD

As the operator pressed one of the 'typewriter' keys, an electric current was sent through the rotating code-letter wheels. No enigma letter could ever be enciphered as itself. The recipient operator would type into his machine the received Morse message in the same order.

LAMPBOARD

Each typed key sent an electrical impulse through the machine and a letter would light up on the adjacent lampboard. This would be repeated until the whole message had been enciphered, when it would then be radioed in Morse to its recipient. The lampboard would light up with the real letters as the cipher was typed in.

PLUGBOARD

This made the machine's wiring much more complicated, increasing the possible encoding combinations by millions. The plugboard settings could also be changed daily. The A-socket of the plugboard connected to the first terminal inside the entry plate, the B-socket to the second, and so on.

on the four-rotor Enigma. Turing, already working on updating the Polish Bombe machines, realised the vital importance of having machines that could speed up the process by mechanically checking off these millions of settings combinations.

While at Cambridge before the war, Turing had developed an original idea: a 'Universal Turing Machine', a sort of 'super-typewriter' that could identify symbols, write, erase and carry out other tasks, all automatically and without human intervention. However, having studied previous Polish encryption machines and a replica Enigma, Turing knew he needed more than even his hypothetical machine. So he studied the mechanics of Enigma, the rotors, wiring and boards, and sought to devise an electrical system with circuits that could decrypt that same text.

Human intervention, Turing knew, was still essential: 'cribs' and mathematical work would still be needed to help the Bombe machine, the device that would decipher

encrypted German messages. The thought of a machine capable of checking millions of combinations at speed was revolutionary. However, Turing was a theoretician rather than a practical codebreaker, so Gordon Welchman, a codebreaker and brilliant administrator working in Hut 6, recruited Oliver Lawn, a mathematician from Cambridge, to help with the making of the machine; thus 'Victory', the first Bombe, was built and installed in Hut 1 on 18 March 1940. Welchman later improved the design of the Bombe with an electronic diagonal board, which increased the machine's powers and capabilities.

Although the German Air Force Enigma was by now being read daily, Naval Enigma proved a tougher nut to crack. In 1941, two significant sea battles – one inside the Arctic Circle, one in the Atlantic – led to the recovery of Enigma

coding documents. It was with this information that Turing calculated a new method he called 'Banburismus',

because it involved holes punched on long pieces of paper made at Banbury. For the rest of the summer of 1941, Bletchley was able to read the majority of German Naval Enigma transmissions, thus providing vital protection to British shipping and a real success story for Bletchley. A significant breakthrough had been achieved, but the team would face tougher battles as the war rumbled on.

The genesis of Bletchley occurs in August 1938 when, at a small rural railway station half way between the university cities of Oxford and Cambridge, a group of ordinary looking people arrive for a social gathering at Bletchley's Victorian country house. Led by Captain Ridley, the entourage are here to enjoy that simple but favoured pursuit of the upper classes: a shooting party weekend. Or are they? In fact, the group of men assembling

A BRIEF HISTORY OF WWII'S CODEMAKERS AND BREAKERS

1923

INVENTION

A Dutch invention, the first cipher motor machine is patented by Dr Arthur Scherbius, who markets it at the 1923 International Postal Union Congress for use in banking, but it proves unsuccessful. Enigma is marketed for use in Germany's armed forces instead for its potential for military use.

1932

THE POLES

Three Polish mathematicians – Marian Rejewski, Henryk Zygalski and Jerzy Rozyski – make the first break into military Enigma using mathematical methods. This includes the invention of Zygalski sheets, a slow and time-consuming method that was used before advances were made to the Enigma machine.

1939

SHARING SECRETS

In July, a secret meeting takes place in Poland between Bletchley Park reps (Peter Twinn, Dilly Knox, Alan Turing and Tony Kendrick) and Gustav Bertrand of French Intelligence, to share discoveries made by Polish cryptanalysts. By September, the Poles have passed Enigma models to British intelligence.

1940

BREAKS, BOMBES AND TIPS

In January the 'Green' (Army) and 'Red' (Luftwaffe) Enigma keys are cracked and in February the sinking of U-33 brings Bletchley its first 'pinch': an Enigma machine. By March the first Bombe machine, 'Victory', is installed in Hut 1 and a new Enigma key is introduced.

STEP-BY-STEP GUIDE TO CODEBREAKING

Follow our five-point guide to crack codes like they did in Bletchley Park

01 LISTEN IN TO ENEMY COMMS TO GATHER THE INTELLIGENCE

At Station X, Bletchley originally used a radio-transmitting room at the top of the Mansion House's turreted tower to intercept Morse, teleprinter and radio codes. However, Bletchley's secret location needed protection, so a series of 'Y' stations were set up across the country. Intercepts were sent to Bletchley either by motorcycle courier or by direct teleprinter line, and were logged into the Registration Room.



02 BREAK THE CIPHER USING MATHEMATICS AND CRIBS

Using brainpower and ingenuity, the codebreakers first worked by hand by looking for features that corresponded to the original plain text. Using cribs and contact analysis, the codebreakers could often spot a possible pattern in the text. Human error on the part of the operators and psychology (imagining how the operators might undertake their work) also came into play when looking for cribs.



03 MAKE SENSE OF THE NONSENSE

Process and check that day's 'cribs', then set up the Typex machines to the same settings as the Enigma machine and type in the enciphered message. Once deciphered it would come out on long strips of paper; cut and glued onto the back of the original message, they were sent back to Hut 6 to finish any decryption left over, via a specially built chute, and then ultimately to Hut 3 for final translation and strategic analysis by a special team.



04 TRANSLATE AND UNDERSTAND THE GERMAN PLAIN TEXT

Hut 3 would use linguists to translate German, Italian and Japanese codes, using the decrypted text sent from Hut 6. At this stage, the Index room would check and cross-reference to see if anything could be spotted that had been seen before, using Hollerith machines and thousands of index cards in Block C. Once analysed, the information was ready to send on as usable intelligence to Winston Churchill in his daily update.



05 SEND INTELLIGENCE TO CHURCHILL AND COMMANDERS IN THE FIELD

Only a few commanders knew about Bletchley and were forbidden to act on its findings, codenamed 'Ultra', until the Germans had been deceived into thinking it had come from another source altogether. 'Special Communication Units' were set up to feed information to the field, first in France in May 1940, then in North Africa and elsewhere from March 1941 onwards. All 'Ultra' messages were destroyed once received.

1941

• CRACKING DOLPHIN

Using the 'rodding' technique, the Italian Naval cipher is broken after the Battle of Matapan by Dilly Knox and his 'girls.' With the recovery of Enigma coding documents from German submarines, notably U-110, along with weather transmissions, Bletchley is finally able to read German Naval Enigma.

1942

• CRACKING SHARK

In February, the Germans introduce a more complex four-rotor Enigma for U-boats: 'Shark', leading to a blackout. In October, two German short-signal codebooks arrive at Bletchley, rescued from U-559. Shaun Wylie and the Hut 8 codebreakers can now break Shark and read U-boat traffic.

1943

• COLOSSUS

The Germans introduce a new short weather code, but Hut 8 avoid another blackout with the help of faster Bombes. Shark is re-broken in ten days – a deciding factor in the Battle of the Atlantic. Max Newman and Tommy Flowers design and build Colossus, the world's first semi-programmable computer.

1944

• D-DAY SUCCESS

Hut 8 and Hut 4's crucial decryption of the German Naval Enigma plays a key role in the Double Cross deception, codenamed Operation Fortitude South, fooling Hitler into believing the Allied landings were planned for Pas de Calais and not Normandy, having a huge impact on the outcome of D-Day.

THE ALLIES STRIKE BACK

■ Codebreakers listen in the intercept control room in Hut 6 at Bletchley Park

"WITH THE INVASION OF POLAND IMMINENT, THEY TURNED TO THE BRITISH FOR HELP IN BREAKING THE ENIGMA SETTINGS, NOW RUNNING AT AN INTIMIDATING 15 TRILLION POSSIBLE COMBINATIONS"

at this isolated location in the depths of the Buckinghamshire countryside are all either members of MI6 and the Government Code & Cipher School (GC&CS), or esteemed scholars and academics, turned codebreakers. For now, they will assess the mansion house and its surrounding area as a possible location to site intelligence operations in the event of a war that seems likelier with every inflamed speech Hitler gives.

When the inevitable happens, they and others return to begin the work that some later believed shortened the war by two years. Men and women from all walks of life will descend onto the railway platform and begin the walk up to Bletchley Park: mathematicians, classicists, engineers, Wrens, WAAFs, linguists, typists, administrators and even debutantes. Each will become a small cog in a large wheel, working independently and under extreme secrecy, unaware of the work being carried out in any hut outside their own. Having signed the Official Secrets Act, they are aware only of the vital importance their work could be to the war effort and that they can never speak of it to anyone.

Despite their undoubted brilliance, it wasn't the British at Bletchley who first made a break into Enigma: that distinction belongs to another nation entirely. In 1932, the Polish had first cracked Enigma; at the time, the cipher changed only once every few months, but by the outbreak of the war it was daily. With the invasion of Poland imminent, they turned to the British for help in breaking the Enigma settings, now running at an intimidating 15 trillion possible combinations – that's a staggering 15 billion billion.

Teams of top codebreakers were installed at Bletchley Park in the prefabricated numbered

huts. These teams were led by Dilly Knox, John Jeffreys, Peter Twinn and Alan Turing. The first breakthrough came with the unravelling of the administrative key used by the German Army, simply known as 'The Green.' This was followed by breaking the 'Red' key, which was used by the Luftwaffe. Of course, it was of paramount importance that the secret that Enigma's code was being broken was kept secure, so a cover MI6 'spy', nicknamed 'Boniface', was invented; throughout the war, Germany believed any breaks in intelligence came as a result of double agents working in the field, instead of a remote codebreaking team.

The codebreaking mechanism was industrialised by the Bombe machine, invented by Alan Turing and Gordon Welchman in response to the need to speed up the process of running through all the possible Enigma wheel configurations. Operated by Wrens, the work was hot, smelly and noisy, but it was invaluable. By 1942, Bletchley's success had reached North Africa, where intelligence enabled the Royal Navy to cut Rommel's supply lines and keep General Montgomery informed of his every move. Early that year, however, the

Germans introduced a more complex Enigma machine with an extra rotor. This caused a major information blackout and proved to be one of the greatest challenges to the codebreakers at Bletchley. However, by the end of 1942, the codebreakers had cracked that one too, thanks to the bravery of the seamen Fasson and Grazier who captured vital Enigma keys and books from the sinking U-559. From now on, Bletchley was able to read 'Shark'.

However, it was the breaking of the German's strategic ciphers that gave Bletchley arguably its greatest success. Initially, manual efforts enabled the cracking of these ciphers, used by Hitler to communicate with Berlin and his commanders in the field. Professor Max Newman realised a new type of machine was needed to keep up with the increasing volume of intercepts being received. With the help of a brilliant young General Post Office (GPO) engineer, Tommy Flowers, such a machine was designed and constructed. This became known as Colossus: the world's first semi-programmable electronic computer and it became essential to the planning by Allied forces for the invasion of Europe and operation D-Day.

Such successes were hoped for at that first 'shooting party' at the mansion in 1938, but, certainly in the beginning, there were many – even within the government itself – who doubted the impact codebreakers could make to the strategic planning of the war. Of these codebreakers, perhaps the most famous known today is Alan Turing. He may have looked and even acted like a true eccentric, but he possessed one of the finest brains of his generation, and his unique ideas for a 'Universal Turing Machine' undoubtedly laid the groundwork not only for the development of the



■ What the senior staff's offices are believed to have looked like

MAP OF BLETCHLEY PARK

BLOCKS F & H

These housed the Testery, Newmanry and the Heath Robinson and Colossus machines. Block F also housed Japanese codebreaking.

HUTS 11 AND 11A

Hut 11 was built to house the Bombe machines, invented by Turing and Welchman to speed up Enigma settings decryption. Hut 11A was built in 1942 to house more Bombes and train the increasing number of Wrens needed to operate the machines.

HUT 4

Used for decrypting Enigma messages sent over from Hut 8, providing crucial daily intelligence in the battles between German U-boats and Allied convoys. The Double Cross Deception, codenamed Operation Fortitude South, was made possible by messages processed in Hut 4 in the lead-up to D-Day.

THE MANSION

Headquarters and recreational; housed senior staff's offices. Originally held the telephone exchange and teleprinter rooms, later moved to a blast-proof hut. This Victorian country house also had a dining room, library, billiard room and ballroom.

D-BLOCK

This housed Hut 6, which decrypted daily settings of the German Army and Air Force Enigma. Hut 3 was also in this block, and once Hut 6 had decrypted the messages, Hut 3 received them for translation and analysis, making often-unintelligible German military language read like a credible report. The block also housed Hut 8, which was used for naval decryption and was first headed by Turing.

BLOCKS A & B

More permanent buildings were needed as Bletchley personnel outgrew the wooden huts. Block A became the Naval Section's decoding centre. Hut 4 moved to Block B in 1942. The Naval Enigma Section now concentrated on breaking into the four-rotor Enigma. Ralph Tester's section, the Testery, was also housed here to break into Lorenz, before moving into Block F.

BLOCK C

A huge clerical index was created by punching onto cards using Hollerith machines. Clerical staff built up a cross-referencing system to help the codebreakers, detailing names of personnel, locations and units. Each week, up to two million cards were used; they were stored in thousands of brown cardboard boxes. Each card was photographed and sent to the Bodleian Library in Oxford as a back-up.

THE STABLE BLOCK

The garages housed the military vehicles, ambulances and carrier pigeons; three linked cottages became staff accommodation; the former fruit store became Turing and Knox's 'think-tank' room, known as 'the bungalow.'



■ The British used Typex cipher machines from 1937

THE ALLIES STRIKE BACK

electronic machines built inside Bletchley as the War progressed, but also for the concept of the computer age. Even in a setting such as Bletchley that was filled with great minds he stood out, leading the historian and wartime codebreaker Asa Briggs to comment, “You needed exceptional talent, you needed genius at Bletchley and Turing’s was that genius.”

Of all his colleagues and codebreakers at Bletchley, his work with Tommy Flowers may have excited Turing the most. They first met in 1939, when the talented young GPO engineer was first introduced to the Enigma secret. Both men were enthusiastic, experts in their fields and respected each other from the outset. Turing would sometimes visit Flowers at his laboratory workshop in Dollis Hill, where they first discussed the idea of building a machine that could decrypt Enigma by using electromagnets. While this would prove to be beyond the scope of the technology then available, Turing’s blueprints and vision for such a machine stayed with Flowers and later resulted in Colossus.

Behind this genius was a troubled man, though. The former Cambridge student could be awkward socially and was homosexual in an age when this was not only frowned upon, but actually illegal. He proposed to a colleague at Bletchley, Joan Clarke, who accepted, but he then recanted the offer and told her of his

sexual orientation. Turing became something of an all-purpose consultant for the growing operation and crossed the Atlantic in November 1942, for highest-level liaisons not only on the desperate U-boat Enigma crisis, but on the electronic enciphering of speech signals between Roosevelt and Churchill. His genius and contribution to the war effort were never properly acknowledged in his lifetime, though, and in 1952 he faced criminal charges after he struck up a relationship with another man, and was placed on hormonal treatment designed to reduce libido. In 1954, at the age of just 41, Turing was found dead in his home in Wilmslow, near Manchester, having apparently committed suicide by cyanide poisoning.

Today, Turing is rightly celebrated for his many and varied achievements, and a bust of his head sits beside an exhibition of some of his personal effects. In 2009, Prime Minister Gordon Brown apologised on behalf of the government and the nation for Turing’s prosecution, and publicly acknowledged the debt of gratitude owed to him by the Allies. The nation and the world’s gratitude should be directed at Turing and those he worked with, all of whom passed through Bletchley’s nondescript railway station. That station saw so much: the girl who joined the Wrens for the dashing uniform and a chance to serve

at sea, who then found herself posted to a place about as far from the sea as it was possible to get in England. The young man in the middle of his mathematics degree and a renowned chess champion, invited to put aside his studies for the duration, and the secretary, eager to ‘do her bit’, who applied for a clerical position in London but was found to be fluent in German and instead given a train ticket to a small town called Bletchley.

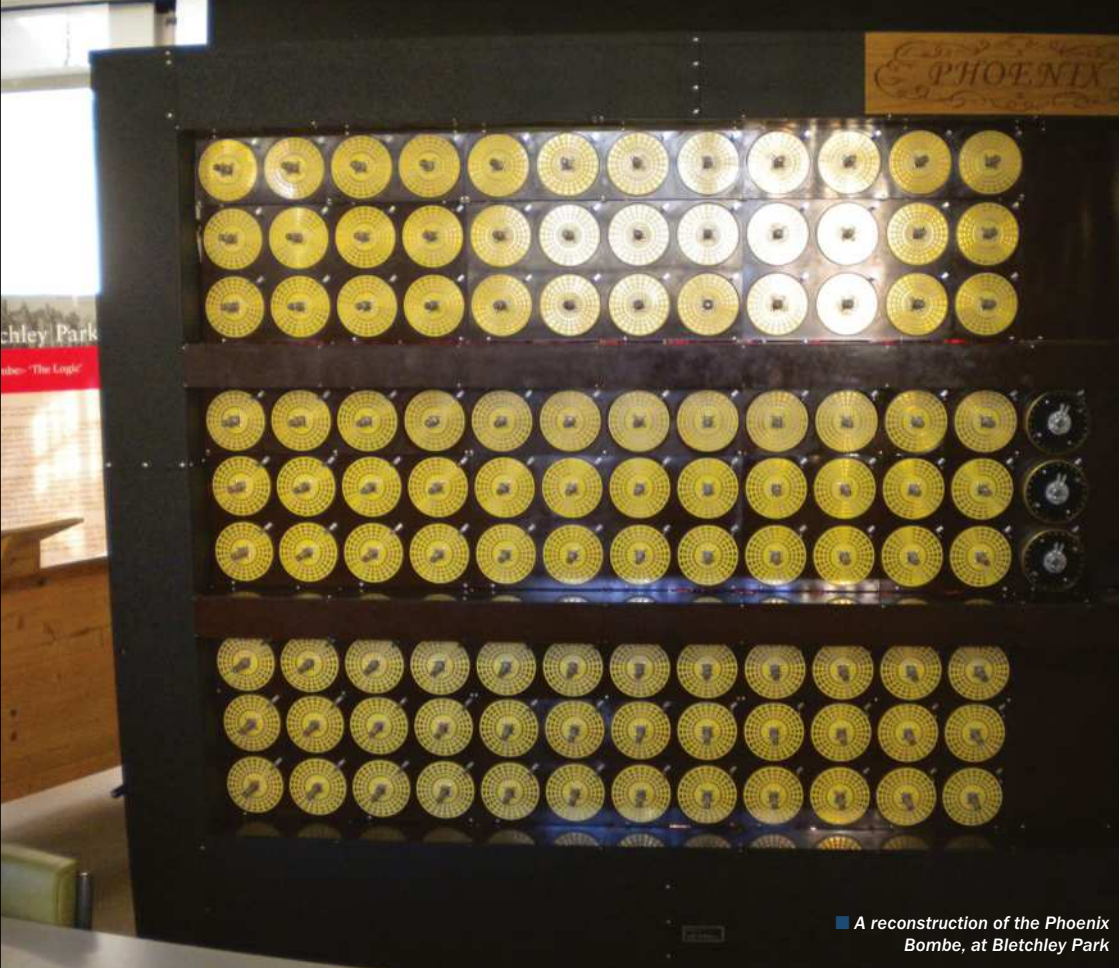
They were ordinary men and women, some barely out of school, whose unique talents and skills were put to use in an altogether extraordinary way. They all came willingly, if a little unknowingly – often via a small, anonymous house in Baker Street, where they signed the Official Secrets Act – to this seemingly insignificant Buckinghamshire town. As they stepped off those trains, they would have had no idea what amazing achievements they would become part of, even if they would never see recognition for it in their lifetimes; nor could they have known the legacy they would help bestow on the nation. But come they did: first slowly, in their hundreds, then more and more as Britain faced the horrors of the Blitz, and then the battles at Dunkirk and D-Day, until by 1945 there were about 10,000 people working at the Park. Bletchley is where their story begins, a story that can finally be told in full and rightfully celebrated.

CHURCHILL'S GOLDEN GEESE

The British PM was one of Bletchley Park’s biggest supporters

Daily boxes of high-level decrypts were sent to Churchill’s office in locked boxes, the key to which he carried on his personal key ring. Only a select few in the Foreign Office and the military knew where they had come from, and not all of those shared Churchill’s faith in Bletchley Park. During his visit in September 1941 he inspected the machines and huts, meeting senior codebreakers. Afterward, he gathered them outside Hut 6 for a short speech, in which he famously described them as his “geese that lay the golden egg – and never cackled.” Recognising Churchill’s support and respect, Bletchley sent him a letter asking for more staff. The prime minister’s response was swift and decisive: “Make sure they have all they want on extreme priority and report to me that this has been done. Action this day.”





■ A reconstruction of the Phoenix Bombe, at Bletchley Park



BLETCHLEY'S GREATEST FEATS

The code-breaking centre's greatest achievements



01 CRACKING LORENZ

Although the 'Y' Stations were intercepting the German cipher machine Lorenz messages in early-1940, they had no idea how the machine was encrypting them. John Tiltman spotted an operator's repetition with abbreviations in August 1941 and used these small inconsistencies to crack the code. Bill Tutte used mathematical analysis to work out how the Lorenz machine worked without even seeing one and by 1942 Lorenz messages were being deciphered. Complications to the Lorenz design in 1943 led Max Newman and his team to need to design an entirely new electronic machine that would break Lorenz; the Colossus.

02 THE INVENTION OF COLOSSUS

Tommy Flowers, a brilliant GPO engineer, built Newman's design and created the world's first electronic semi-programmable computer in December 1943. By the end of the war, the ten Colossus machines in use were ordered to be dismantled, along with all records but only six were. It had taken weeks to break Lorenz with mathematical calculations: Colossus could do this in hours, reading the paper tape at 5,000 characters a second and sending the tape travelling in the wheels at 48 kilometres (30 miles) per hour.



03 D-DAY

Without Bletchley, D-Day may well have had a different outcome. In June 1944, Colossus helped to fool German High Command of Allied plans. As well as providing information on German positions, the breaking of ciphers sent by the German Secret Intelligence Service allowed the Allies to confuse Hitler over where they would land; Hitler decided to divert his troops away from the very beaches the Allies had chosen in Normandy. Bletchley was able to read messages between Garbo (a network of 27 fictitious spies) and the Abwehr, showing Hitler had fallen for the deception.



BREAKING POINT

AS TENSIONS ROSE ON BOTH SIDES
OF THE ATLANTIC, THE OCEAN-
SPANNING BATTLE BETWEEN AXIS AND
ALLIES REACHED ITS CLIMAX



100 ENTER THE AMERICANS

Although it would take the attack on Pearl Harbor to precipitate war, the US Navy and the Kriegsmarine clashed throughout 1941

104 GRUMMAN F4F MARTLET

A hardy fighter that helped the Allies dominate the war in the Atlantic

108 BLACK MAY

The drawn-out conflict came to a head in May 1943, with a series of deadly clashes

112 STALKING PREY IN THE TROPICS

Dogged by sabotage and suicide, the career of U-505 proved particularly disastrous

116 HMS MEDUSA

Charged with protecting British coasts from the U-boat threat, this vessel also guided Allied landing craft on D-Day

122 10 DEFINING ENGAGEMENTS: DECIDING THE ATLANTIC

Instead of a single showdown, it would be a series of crucial engagements that would settle the Battle of the Atlantic



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ENTER THE AMERICANS

ALTHOUGH IT WOULD TAKE THE ATTACK ON PEARL HARBOR TO PRECIPITATE WAR, THE US NAVY AND KRIEGSMARINE CLASHED THROUGHOUT 1941



Until the Japanese attack of 7 December 1941, the United States had declared a public policy of neutrality. Mindful of the First World War, which American troops had entered in April 1917 and suffered over 116,000 military deaths (from all causes),

a growing call for isolationism resulted in strict laws being created to prevent involvement in any new conflict. The so-called Neutrality Acts of the 1930s severely curtailed American participation in any external conflicts. However, after the outbreak of European war in 1939, various political compromises were reached and aspects of the act repealed to allow the Lend-Lease supply of military equipment and aid to the Allies. The growing cooperation between the United States and Great Britain was further underlined during August 1941, when Churchill and Roosevelt signed what became known as the Atlantic Charter, which set out goals for the post-war world.

By the middle of 1941 a US Navy destroyer group designated 'Support Force, United States Atlantic Fleet' was in operation as part of the American 'Neutrality Patrol' engaged in escorting British convoys to and from a mid-Atlantic meeting point at around the 55th meridian. Inevitably this led to clashes with U-boats as the difficulty of differentiating British and American escort vessels within the Atlantic – and frequently during night attacks – were enormous. On 11 April 1941, after rescuing Dutch survivors of a sunken merchant ship, destroyer USS Niblack attacked what it believed to be a submerged U-boat. Often related as the opening of American-German hostilities, it's likely that no U-boat was present; the contact was either a false echo or whales.

The U-boats' first American merchant ship victim was sunk by U-69 on 21 May 1941, after SS Robin Moor had been stopped, searched and determined to be carrying contraband. Once the crew had abandoned ship, it was sunk by torpedo and artillery fire. In response, President Roosevelt subsequently froze all



■ Winston Churchill and Franklin D. Roosevelt aboard USS Augusta in Newfoundland during their first face-to-face meeting whereupon they signed the Atlantic Charter



German and Italian assets within the United States. Several other American merchant ships were sunk over the weeks that followed, while military confrontations escalated.

On 20 June, Kapitänleutnant Rolf Mützelburg aboard U-203 sighted a zigzagging darkened battleship within the declared U-boat 'free-fire' zone between Iceland and Greenland. After identifying the ship, Mützelburg moved to intercept while radioing BdU: "Have sighted US battleship Texas in blockade area. Request permission to fire."

For 16 hours, he stalked the warship, before Dönitz responded: "By order of the Führer, all incidents with United States ships must be avoided in the coming weeks. Until further notice, attacks may not be made on battleships, cruisers, and aircraft carriers unless identified as hostile. Warships steaming at night without lights are not necessarily hostile."

The order from Berlin frustrated Dönitz as well as his U-boat commanders. At a time when they needed to concentrate all available power against the Atlantic trade routes, they were prevented from attacking their most dangerous opponent, the convoy escort, unless certain of nationality. Simultaneously, after American forces relieved British occupation troops in Iceland – an important convoy escort staging point – in July 1941, the frequency of encountering US Navy vessels dramatically increased.

THE UNDECLARED WAR

During September 1941, USS Greer, en route from Argentina to Reykjavik with mail, received British aircraft warnings of a nearby U-boat; having established sonar contact, the US destroyer began to pursue U-652 from close range. The prowling British bomber dropped four depth charges on the estimated location of Oberleutnant zur See Georg-Werner Fraatz's boat who, in the mistaken belief that the destroyer had fired and misidentifying her as one of 50 old American destroyers that had been transferred to Allied control, fired a single torpedo. Though it missed, the ensuing cat-and-mouse battle lasted for two hours, in which USS Greer dropped 19 depth charges and U652 fired a second torpedo that also missed. This inconclusive duel eliminated all doubt that the US Navy and Kriegsmarine were on opposing sides. President Roosevelt publicly declared that the U-boat attack on the Greer was an act of 'piracy' and issued orders that the US Navy would 'shoot-on-sight' any German or Italian ships found within the Pan-American Safety Zone adjacent to the eastern seaboard of North and Central America that he had declared in 1939.

The following month, on 17 October, USS Kearny was torpedoed by Kapitänleutnant Joachim Preuss's U-568. Kearny and three other US Navy destroyers had been summoned to assist the hard-pressed Canadian escort force of convoy SC-48 under attack by U-boats and already having lost ten merchant ships. With Kearny hit on the starboard side, 11 men were killed and 22 wounded, including the captain; the ship reached Iceland under escort by USS Greer for temporary repairs.

■ SS Patrick Henry, the first of the 'Liberty Ships' launched in September 1941



LIBERTY SHIPS

The American flair for mass production that would help turn the tide of war

During 1940, Churchill's government ordered 60 Ocean-class merchant ships from American shipyards to help replace those lost to U-boats. Cheap and quick to construct, the first was launched during August 1941. Inspired by the relatively simplistic model, American designers improved the engine and replaced riveted construction with more cost-effective welding. They also instituted the prefabrication of sections that could be transported by rail across the United States and then welded together to form a complete vessel, in the style of assembly-line construction. These American ships were designated Type EC2-S-C1, the 'EC' standing for 'Emergency Cargo', as they were considered a stopgap measure to produce large numbers of replaceable ships.

Roughly standardised to a displacement of approximately 10,000 tons, the first of the EC ships was SS Patrick Henry, which hit the water on 27 September 1941 after 150 days of construction; the shipyard being built alongside the ship itself! That day was known as 'Liberty Fleet Day' as 14 vessels of various types were launched across the United States. President Roosevelt attended the launch of SS Patrick

Henry and within his address to the assembled crowd quoted the ship's namesake orator from the Revolutionary War when he said: "The Patrick Henry, as one of the Liberty ships launched today renews that great patriot's stirring demand: 'Give me liberty or give me death.'" Motivated by his words, it was not long before the EC vessels began to be known as 'Liberty Ships'.

Tapping a vast reservoir of semi-skilled workers, including huge numbers of women, American shipyards began producing Liberty Ships at a prodigious rate; the fastest construction time set by the SS Robert E Peary, launched on 12 November 1942 after only four days, 15 hours and 29 minutes between the keel being laid to launching.

Initially derided as ugly, and not without teething problems caused by structural defects, Liberty Ships – and their successors the Victory Ships – were produced throughout the war years, with many serving well into peace time. The last of 2,710 Liberty Ships to be launched was the SS Albert M Boe on 26 September 1945, while the final Liberty Ship taken out of service was the subsequently diesel-refitted SS Thomas Nelson, which was finally scrapped in 1981.

■ U-123 using its deck gun against a merchant target. This boat spearheaded 'Operation Paukenschlag', opening the attack in January 1942



■ Tanker SS Byron D Benson burning off New Jersey after being torpedoed by U-552 on 5 April 1942



“ROOSEVELT PUBLICLY DECLARED THAT THE U-BOAT ATTACK ON THE GREER WAS AN ACT OF ‘PIRACY’”

Though this tested diplomatic relations yet further, they did not break. Even the next disaster failed to bring about open warfare. Based in Iceland, destroyer USS Reuben James sailed with four other escorts to join eastbound convoy HX-156. On the last day of October, Kapitänleutnant Erich Topp in U-552 sighted the convoy and closed to attack. Positioned between an ammunition ship and the faint direction finder trace of the nearby U-boat, the American destroyer was hit in the forward magazine by a torpedo meant for the merchant; the bow blown off and sinking immediately, the stern going down five minutes later. Of seven officers and 136 men aboard, only 44 men survived. In every real sense, the US Navy and Kriegsmarine were at war.

DRUMBEAT ON THE AMERICAN COAST

Following the ‘day of infamy’ at Pearl Harbor, 7 December 1941, it took only four days for Hitler to declare war on the United States in accord with the spirit of the Axis Triple Alliance. Germany was now in conflict with one of the world’s strongest industrialised nations. While the Wehrmacht would be bled dry in the expanse of the Soviet Union, it now faced the virtually

untapped resources of the United States in intercontinental war.

All restrictions on U-boat operations within the Pan-American Safety Zone were removed and Dönitz envisioned a ‘truly spectacular blow’ mounted by 12 long-range Type IX U-boats. However, Kriegsmarine command in Berlin authorised the use of only six, much to his chagrin. In the event, with U-128 in need of urgent repairs, only five boats – U-66, U-109, U-123, U-125 and U-130 – sailed from France for Operation Paukenschlag (Drumbeat), which stationed attacking U-boats between Nova Scotia and North Carolina. A secondary supporting assault by smaller Type VIIC U-boats against Canada was also scheduled, but it was Paukenschlag that harvested a terrific toll within American waters after U-123 opened the offensive by sinking SS Cyclops on 11 January. With U-123 having pre-empted the scheduled opening of the planned offensive, it was U-130 Korvettenkapitän Ernst Kals who made what he called ‘an attack on the first drumbeat’ and torpedoed Norwegian freighter SS Frisco at the mouth of the Gulf of St Lawrence on 13 January 1942. Paukenschlag had begun.

By the beginning of February, the first five U-boats to operate against the North American coast were low on fuel and heading home.

They had sunk 25 ships totalling 156,939 merchant tons. The greatest successes had been achieved in United States coastal waters where merchant ships sailing individually at night were frequently silhouetted against the undimmed lights of the east coast. For U-boat commanders accustomed to hunting darkened convoys, it was a veritable bonanza of easy targets. Those allocated Canadian waters found the going more difficult against a country that had been on a war footing since 1939. However, when combined with the wave of Type VIIIs that joined the Canadian fray, by the beginning of February, 41 ships had been sunk in North American waters. Dönitz could only wonder what he could have achieved if he had been given the 12 boats that he had wanted for ‘Paukenschlag’.

TORPEDOES AMID THE PALM TREES

The opening of war against the United States also brought U-boats to the Caribbean Sea and Gulf of Mexico, hunting for oil tankers. U-boats of the Operation Neuland group breached the Caribbean; Kapitänleutnant Albrecht Achilles mounting a spectacular attack on Trinidad when he took U-161 surfaced through treacherous reefs into Port of Spain harbour on the night of 19 February. There he torpedoed two tankers before escaping surfaced under the noses of shore batteries and frantic patrol craft with navigation lights blazing. In total, he sank five ships and damaged four more before a triumphant return to Lorient, where he was celebrated as ‘The Ferret of Port of Spain’.

By the end of the Neuland group’s Caribbean onslaught, they had sunk 41 ships, 18 of them tankers. Compared to Paukenschlag, the Caribbean boats had destroyed over 70,000 tons more merchant shipping. The shooting season, however, would not last indefinitely, though the US Navy was undoubtedly slow to adapt to its new war footing. Admiral Ernest King, the highly capable commander-in-chief, United States Fleet, was an outspoken Anglophobe. His personal dislike of everything British certainly influenced American refusal to accept advice from the Royal Navy such as the institution of blackout regulations on the eastern seaboard or convoying of coastal merchants. However, a lack of escort vessels also hamstrung King as his forces were already stretched within other areas of the Atlantic. The US Navy and Coast Guard were instead ordered to perform ASW missions; missions so regular and predictable that U-boat commanders brushed them off. Not until May 1942 did King institute merchant convoys along the east coast and the tide swung once more against the U-boats.

Germany was now in a race to dominate the Soviet Union and Britain before the huge material reserves of the United States could be brought to bear against it. Though many within the United States felt the Pacific war of greater priority, Roosevelt had committed to a policy of ‘Germany First’ and soon American factories were producing huge quantities of weapons for rapidly expanding military forces, and shipyards began to hum with productivity. A sleeping giant had awoken.

GRUMMAN F4F MARTLET

A HARDY FIGHTER THAT HELPED THE ALLIES DOMINATE
THE WAR IN THE ATLANTIC AND THE PACIFIC

GRUMMAN MARTLET AL246

LENGTH: 8.8m (28.9ft)

WINGSPAN: 11m (38ft)

RANGE: 1,239km (770 miles)

ENGINE: Reciprocating Wright R-1820 G205A

Cyclone

MAXIMUM SPEED: 527km/h (328mph)

CEILING: 12,029m (39,500ft)

CREW: 1

PRIMARY WEAPON:

4 x 0.5in M2 Browning machine guns

SECONDARY WEAPONS:

2 x 100lb bombs



Originally ordered by France from the USA in 1940, the Grumman Martlet was produced too late to aid the French when the Wehrmacht marched into the Ardennes. Sent back to Britain instead, the aircraft would play a key role in all theatres of World War II from Norway to Africa and the Far East.

1,123 Martlets served the Allies in the war and the craft became invaluable in the Battle of the Atlantic, sinking 23 U-boats. Their main role was to provide anti-submarine support for the Arctic convoys that sent supplies to and from the Allied powers. However, they are most famous for proving their worth in the Pacific with the American forces.

Known as the Wildcat in the USA, the fighter contributed to the battles of Wake Island and Midway, among others. There, it gained a reputation as a tough and reliable fighter plane that could soak up Axis bullets. It may not have been as technically advanced as its rival, the Japanese Mitsubishi Zero, but its higher-service

ceiling allowed it to power-dive the Zero out of the sky.

Production of the aircraft ceased in 1945 as newer planes such as the iconic F4U Corsair and F6F Hellcat replaced the by-now aging Wildcat. However, its legacy was secure: the final victory-to-loss ratio for the F4F during the war was an astonishing 69:1, demonstrating just how valuable it was to the Allies.



■ 7,885 F4Fs were built in total and they were the main shipboard fighters for the USA when it entered the war in 1941

■ The Fleet Air Arm Museum's Martlet is the only surviving F4F-4 model in the world and was the fighter the Allied navies desperately needed in 1940



WILDCAT FIGHTER ACES

The highest-scoring US F4F pilots of the war



MAJOR JOE FOSS

Joe Foss was the top-scoring ace of the war with 26 victories in a mere 44 days of combat. He was awarded a Medal of Honor in recognition of his services

and served with distinction as a lead pilot in the Guadalcanal Campaign.



COLONEL JOHN LUCIAN SMITH

The destroyer of 19 Japanese planes, John Lucian Smith was another recipient of the Medal of Honor. In the Solomon Islands Campaign, he led Marine fighter Squadron 223, which downed 83 aircraft.



MAJOR GENERAL MARION EUGENE CARL

Marion Eugene Carl was awarded the Navy Cross twice, his first earned at the Battle of Midway and his second won at Guadalcanal. At one point his

fighter was shot down and he spent five days living with natives.



■ The dials in the cockpit are all original components and have not been altered since the aircraft arrived at the museum

COCKPIT

Seated right in the centre of the fuselage, behind the engine, the pilot had a good view of his surroundings, which helped with manoeuvres and overall performance in dogfights. The only downside was a reduced viewpoint of the pilot's 'six' due to the razorback design of the cockpit. The landing gear was controlled by a hand crank, which was one of the oldest contraptions on the whole aircraft. F4Fs often lacked armour behind the seats when they came straight off the production line, but this was strengthened before they were thrust into battle.

WHEELS

The narrow track undercarriage gave the aircraft its name, Martlet. In English tradition, a Martlet is a bird with ineffective legs, and the fighter was renowned for having a weak undercarriage, so the name stuck. The Martlet name was not taken on by US forces, which preferred the more war-like title Wildcat. One of the most advanced devices on board the plane was the ZB homing device, which allowed the aircraft to find ships within a 48-kilometre (30-mile) range when troubled by poor visibility.



■ The F4F was a barrel-shaped plane with angular wingtips and narrow undercarriage. Auxiliary fuel tanks greatly increased its range

“THE MARTLET NAME WAS NOT TAKEN ON BY US FORCES, WHICH PREFERRED THE MORE WAR-LIKE TITLE WILDCAT”



■ The wheels would retract into the fuselage when the mid-wing metal monoplane was in the air



WRIGHT R-1820 G205A CYCLONE ENGINE

With a constant-speed three-bladed propeller, the pace of the F4F allowed it to strafe targets before the heavy bombers were called in to finish the job. The F4F's power came from its nine-cylinder engine that packed more than 1,000 horsepower into the fighter. This particular model used the Wright R-1820 Cyclone while later models, especially in the USA, installed a redesigned Pratt & Whitney R-1830-76 series engine that included a two-stage supercharger. The engine was situated in front of the pilot but was cleverly fixed in a way that did not obscure his forward view.

RIVALS IN THE SKY

Which aircraft tussled with the F4F for air supremacy?

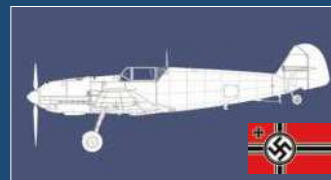
MITSUBISHI A6M ZERO

The scourge of the F4F in the Pacific theatre of World War II, the Zero could outmanoeuvre the Wildcat and had a much longer range. It held this advantage over the F4F until the US pilots began using hit-and-run attacks that allowed their fighters to weave and protect one another's tails, tactically outthinking the Japanese.



MESSERSCHMITT ME 109 T

The Third Reich preferred to use U-boats instead of carriers, so carrier-based fighters never got off the ground for the Kriegsmarine. The Me 109 T was a version of the Messerschmitt considered for Nazi carriers but only 70 were made before the programme was cancelled. This small number was still used in the defence of the Reich.



BREWSTER F2A BUFFALO

Before the F4F made its name in the war, the Buffalo was actually the preferred aircraft of the USA. The successor to the F3F biplane, it soon became apparent that the Buffalo was too sluggish and cumbersome to be effective in the air. They struggled in the Battle of Midway and were soon replaced by the Wildcat throughout the US Navy.



“THE WILDCAT HAD A LIMITED BOMBING CAPACITY OF ITS OWN AND CARRIED JUST TWO 100LB BOMBS”

■ The Fleet Air Arm Museum's Martlet AL246 is the only surviving F4F-4 (G-36A) in the world and spent its life serving Britain

■ One of the main features of the Martlet F4F-4 was folding wings, allowing more to be stored on carriers



■ Some US pilots, like Edward 'Butch' H O'Hare, were so accurate with the F4F weaponry that they could aim and shoot directly at the engines of enemy fighters



MACHINE GUNS

To blast enemies out of the sky, the F4F had four .50 calibre Browning machine guns carrying 400 rounds each. Later models of the Wildcat had six machine guns, which not only added more power but was also a relief to the pilots, as the armament had an unfortunate habit of jamming. When engaging U-boats in the Atlantic, the fighter would shield bombers such as the Avenger from the submarine's anti-aircraft fire while the bomber dropped depth charges and acoustic torpedoes. The Wildcat had a limited bombing capacity of its own and carried just two 100lb bombs.



“1943 WOULD PROVE TO BE A TUMULTUOUS YEAR FOR THE GERMAN U-BOAT ARM, OR U-BOOTWAFFE (UBW), WHICH WOULD EXPERIENCE BOTH DIZZYING HIGHS AND CRUSHING LOWS IN THE ATLANTIC”

BEATING THE U-BOATS

How new technology and tactics helped turn the tide in the Atlantic

Part of the reason ‘Black May’ was so successful was the Royal Navy’s ability to find new tactics and technology to fight the U-boat threat without revealing them to the Germans.

While depth charges were certainly effective against U-boats, new weapons proved to be even more deadly. The Hedgehog was a forward-firing spigot mortar that could spread 24 missiles up to 250 metres in front of the destroyer or corvette it was mounted on. This was extremely useful as ships could now chase down U-boats, something they could not do with depth charges as these were launched from the stern of the vessel. Another advantage was that the Hedgehog mortars would only detonate when they struck a U-boat, meaning that friendly radar would not be disrupted. The warheads could also puncture the hull of a U-boat rather than relying on hydrostatic shock waves to damage it, leading to a more effective overall weapon.

One problem faced by Allied sailors was that the ASDIC, the sonar used to find and track U-boats, spread outward from the front of the ship. This coupled with the fact that depth charges, one of the most common submarine-hunting weapons, fired from the back meant that an escort tracking a U-boat could lose sight of it in its final attack run. This lack of mobility was overcome with new tactics like the ‘creeping attack’. In this scenario, one Allied vessel would stay stationary and keep the U-boat in its radar range while guiding a second ship to the enemy’s location and then signal when to release its deadly cargo. This enabled U-boats to be kept under constant scrutiny while an escort was in a position to attack and sink them.

Another problem facing convoys early on in the war was a lack of comprehensive air cover away from friendly shorelines. This was due to the Allies not possessing any aircraft capable of long-range patrols across the vast Atlantic Ocean. Leaps made in aviation technology meant that planes like the B-24 Liberator could be modified into long-range submarine hunters to spot and engage rogue U-boats. German attempts to bolster their AA defences on U-boats were met with limited success and aircraft soon became the number one foe.



BLACK MAY

IN THE FRIGID WATERS OF THE ATLANTIC, THE ROYAL NAVY AND KRIEGSMARINE FOUGHT TOOTH AND NAIL IN A DEADLY GAME OF ATTRITION



The Royal Navy convoy SC-130, carrying supplies across the vital lifeline between North America and Britain, coasted out of Halifax harbour on 11 May 1943. 37 supply ships, relying on their eight escorts to see them safely across the vast ocean expanse, were already in the Kriegsmarine's

sights. A U-boat wolf pack had their scent, of which U-954 was a part. Its last transmission was received by the Germans on 19 May when it was attacked and sunk with all hands, along with four other U-boats, by the new Hedgehog weapon systems of Royal Navy destroyers HMS Jed and HMS Sennen. U-954 was a new vessel, commissioned just six months earlier, and boasted an experienced commander and crew. Its loss on its first patrol would demonstrate the dire situation U-boat captains found themselves in the spring of 1943. Admiral Karl Dönitz would not hear about U-954 until 24 May and so would learn the fate of his son, Peter Dönitz, who had been a watch officer on board the vessel. No mention is made of this loss in Dönitz's memoirs, but it must have driven home, on a personal note, the fact that May 1943, known as 'Black May', would spell the end of the U-boats' supremacy at sea.

1943 would prove to be a tumultuous year for the German U-boat arm, or U-Bootwaffe (UBW), which would experience both dizzying highs and crushing lows in the Atlantic. In the early stages of the war, U-boats had enjoyed targeting poorly defended Atlantic convoys as the Allies struggled to find tactics to counter the menace. In March 1943 the U-boat offensive would reach its peak, with constant skirmishes with convoys seeing Allied losses totalling 82 ships and 476,000 tons of supplies sent to the bottom of the ocean. In contrast, only 12 U-boats were lost in the entire month. The Battle of the Atlantic was a terrible war of attrition with ships, supplies and tonnage being the targets. If Germany could keep sinking supply ships faster than the Allies could build them, then they could hope to starve Britain to the negotiation table. In a similar vein, the Allies had to keep U-boat casualties high and beat the production of the craft in order to keep their populations' bellies full. One Royal Navy report shows the desperate situation the Allies were under: "The Germans never came so near to disrupting communications between the New World and the Old as in the first 20 days of March 1943." Winston Churchill also expressed

■ HMS Vanoc, with her crew looking on, drops a depth charge over a U-boat during an Atlantic convoy

his fears about the situation, saying, "The Battle of the Atlantic was the only thing that really frightened me."

As April rolled around, the battered Allied convoys would gain a small respite as many active U-boats returned to their docks for rest and resupply. Even still, 39 ships with 235,000 tons of supplies were lost in comparison to 15 U-boats. April also saw what has been described as 'one of the most remarkable convoy attacks of the war', in which a single U-boat, U-515, engaged convoy TS-37 on 30 April. Ambushing the rear of the convoy just before midnight, U-515 initially launched six torpedoes with four finding their marks, seeing precious tankers and their fuel lost to the Allies. A few hours later, the U-515 found its next opportunity and sank two more vessels, with an additional ship being damaged and sinking before it reached port. For this action, U-515 commander Werner Henke was awarded the Knight's Cross with Oak Leaves. Despite victories like this, the tide was turning against the UBW. 27 April would see Admiral Dönitz issue a new order to his submarine commanders regarding their movements and tactics. When crossing the Bay of Biscay, found between Western France and Northern Spain, the submarines were to submerge during the night and resurface during the day, but only long enough to recharge their batteries. It was hoped that this tactic would reduce their losses and help them to avoid detection by Allied forces. Unfortunately for Dönitz, his plan backfired as this move enabled 12 RAF squadrons to redeploy to daylight anti-submarine operations, tightening the noose on the already floundering U-boat fleet.



■ An already damaged merchant ship is finished off by another U-boat torpedo

THE TIDE TURNS

The economic scales were tipping in favour of the Allies by the end of April, with convoy engagements like SC-130 paving the way for the U-boats' swan song. The first signs were visible when Convoy ONS-5, en route from Liverpool to Halifax, Canada, was targeted. On 21 April the 42 ships departed England on their three-week journey to Nova Scotia. The spirits of the men must have been high as their initial escorts consisted of two destroyers, one frigate and four corvettes, usually enough to see off any U-boats that might be prowling the seas.

With the cracking of the Enigma code and the utilisation of ULTRA intelligence, Atlantic convoys had enjoyed a relatively easy time

of avoiding wolf packs. A temporary blackout in the latter half of April, along with German U-boat reinforcements, saw UBW feel confident about their hunting chances in May.

Taking a northerly route near Iceland would grant the convoy extended air support and although there was a greater risk of icebergs and severe weather warnings, these adverse conditions would mean the U-boats would be keeping their heads down as well. The decision seemed to be paying off, however, as on 24 April U-710, making its way to the Atlantic from its berth in Germany, was sunk by an escorting B-17 when it came too close to the convoy.

After an uneventful few days, the convoy came into the sights of a U-boat patrol line. U-650 caught the movement of the convoy



■ The Hedgehog weapon was so named as the ammunition resembled the spines of the animal

on the morning of 28 April and the wolf packs sprang into action. Other U-boats converged on U-650's position throughout the day and a deadly game of cat and mouse had begun. The Germans had thrown away the element of surprise, however, as radio chatter between the U-boats was intercepted by the convoy, which now took evasive action in anticipation of the coming battle.

Already on the back foot, the U-boats decided to launch a night-time attack, when visibility of the convoy would be poor. The lack of visibility worked against them as their torpedoes failed to make any impression on the Allied ships, which answered in kind and severely damaged two submarines, leaving them to limp back to a friendly port.

This pattern continued for the next few days, with the U-boats failing to score a direct hit against the convoy. They were now in a race against time as the initial confrontation saw the British dispatch additional escorts to deal with the growing menace. If the Allied merchantmen thought that they were now safe from danger, however, they were very wrong. 4 May would see the convoy take heavy losses as several U-boats banded together, launched an attack at dusk and continued the pressure throughout the night. In total, seven Allied ships were lost to one U-boat. The next day would see the

continuation of these ferocious attacks with another five supply ships sunk to three U-boats. Admiral Dönitz, seeing the level of attrition as unacceptable and unsustainable, ordered the attacks on this convoy to cease. With over 40 U-boats involved in attacking the convoy along its route, the confrontation was a wake-up call that updated tactics and new technology employed by the Allies were a winning combination. Although the convoy's losses had been heavy, many ships still reached their destinations while the Germans were left with six U-boats lost and seven damaged; losses they could ill afford now that the tide of war was turning. The U-boats' day in the sun was at an end.

GERMANY RESPONDS

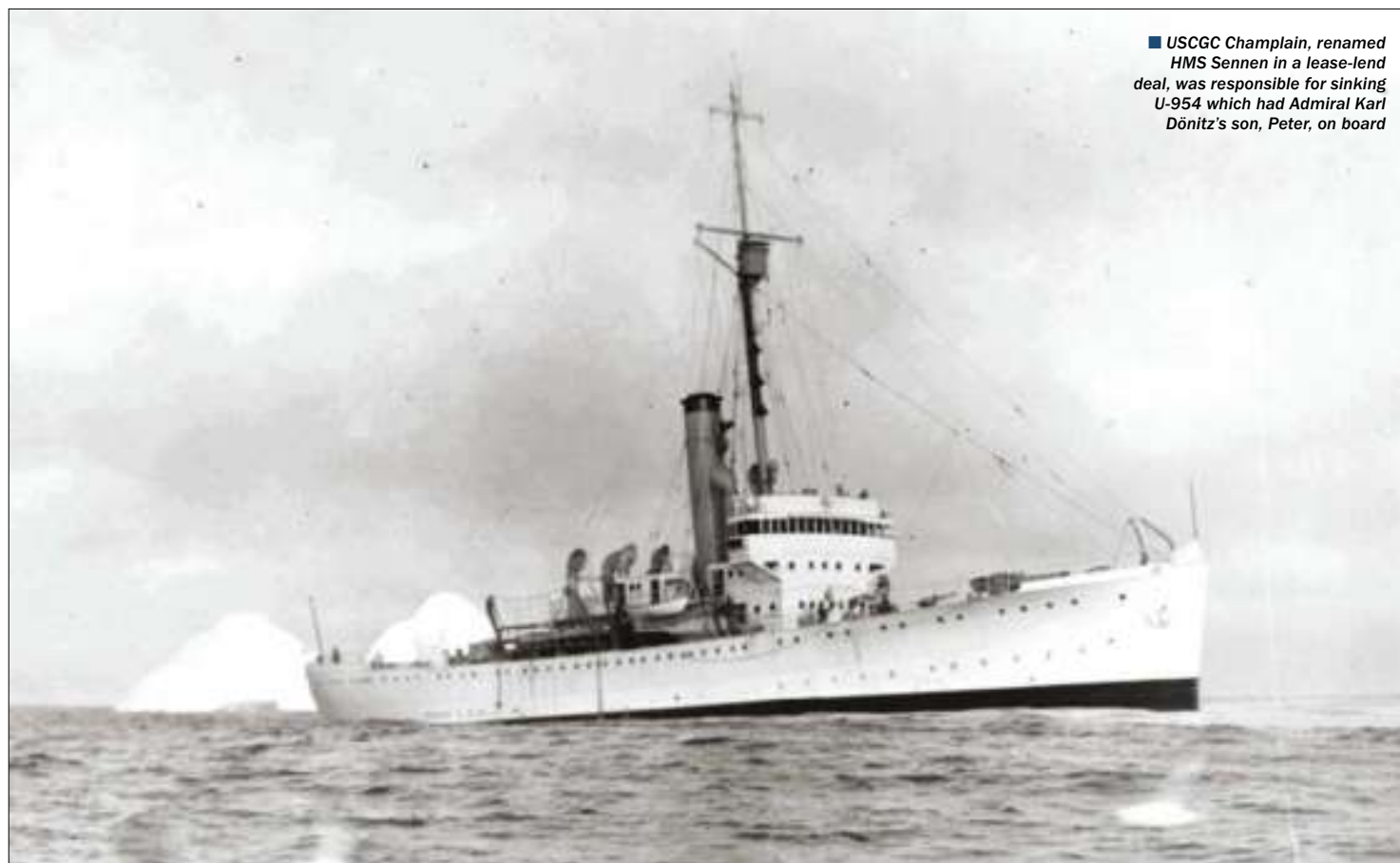
Ironically, May 1943 saw the U-boat fleet reach peak strength with 240 vessels operational and seaworthy. Out of this total, 118 were armed, ready and out at sea. To offset this, the Kriegsmarine would lose 41 U-boats in 'Black May', a major blow to U-boat operations in the Atlantic. Various strategies to cope with these losses were laid out, such as sending U-boats to new waters like the Indian Ocean. The Germans rightly estimated that convoys there would not be as heavily defended, but also failed to note that fewer convoys meant fewer

targets. By the end of the war, Monsun Gruppe had failed to make an impact on Allied supply lines in the East.

New technologies, like the snorkel (Schnorchel), which made its debut in August 1943, were the main hope to save the day for the Kriegsmarine. With a U-boat's powerful diesel engines needing air to operate, they were only run on the surface, with electrical engines powering the craft underwater. The schnorchel allowed airflow to the engines while submerged and gave the U-boats a great turn of speed and allowed them to dodge enemy radar. The technology was still in its infancy, however, and it was plagued by technical problems, not to mention that radar had advanced to a level where even a tiny snorkel could be picked up in the vast expanses of the Atlantic.

Admiral Dönitz, shocked at the defeat of his forces, ordered a cessation of all U-boat operations on 24 May and had them return to friendly waters. Not only were the losses in material and vessels felt, but the Kriegsmarine also lost scores of experienced crew, including many junior officers who were being groomed for command. The admiral must have also felt the losses personally from the death of his son. From his personal memoirs, it is possible to glean an insight into his feelings about the disastrous campaign: "Losses had suddenly soared. By May 22 we had already lost 31 U-boats since the first of the month, a frightful total, which came as a hard and unexpected blow; for, notwithstanding the very much more powerful enemy anti-submarine forces in operation in this fourth year of war, an increase in U-boat losses had not until this moment been perceptible... We had lost the Battle of the Atlantic..."

"4 MAY WOULD SEE THE CONVOY TAKE HEAVY LOSSES AS SEVERAL U-BOATS Banded TOGETHER, LAUNCHED AN ATTACK AT DUSK AND CONTINUED THE PRESSURE THROUGHOUT THE NIGHT"



■ USCGC Champlain, renamed HMS Sennen in a lease-lend deal, was responsible for sinking U-954 which had Admiral Karl Dönitz's son, Peter, on board

■ Additional torpedoes were stored in shallow holds under the deck of U-505. The image was taken after its capture

STALKING PREY IN THE TROPICS

WORDS:
WILLIAM WELSH

FROM SINKING A NEUTRAL SHIP TO BEING CAPTURED BY THE ENEMY, THE CAREER OF U-505 PROVED PARTICULARLY DISASTROUS



torpedoes away!" said U-505 Korvettenkapitän Axel-Olaf Loewe as he watched his prey through the periscope. His crew heard the characteristic loud hissing sound and felt their submerged vessel shudder as two torpedoes exited the front

tubes and sped toward the SS Thomas McKean 1,200 metres away. Loewe and his firing team had made their calculations perfectly, and the 23-foot torpedoes exploded at 7:23am on 29 June 1942 against the stern of the 7,191-ton American Liberty ship on its maiden voyage. Secondary explosions rippled through the freighter as its crew lowered their lifeboats into the Atlantic Ocean 350 miles northeast of Puerto Rico.

After three lifeboats were clear of the stricken vessel, U-505 broke the surface, shedding the water from its grey hull as it rose from the sea. Gunners began raking the stricken vessel at the waterline with high-explosive shells from a high-velocity deck gun.

After two prolonged firing sessions, Loewe conned his vessel over to one of the lifeboats. He queried the survivors in English and then he and his officers handed the men medical supplies. The gun crew then resumed its firing until the ship sunk bow first. With it to the bottom of the sea went 9,000 tons of Lend-Lease cargo, including bomber aircraft, tanks and trucks bound for Russia.

"It took 80 [high-explosive] rounds from our powerful 105mm gun before the flaming ship finally rolled over and sank," said Hans Goebeler, a machinist second class on U-505. "It was quite a fireworks show... Our spirits were as high as heaven."

MUTUAL RESPECT

Five months earlier, Loewe had guided U-505 from Hamburg, Germany, around the British Isles to Lorient, France, where it became part of the 2nd Flotilla. The rough seas encountered during the 15-day winter passage through the North Atlantic precluded the ship from hunting

merchant vessels. The voyage was deemed its first war patrol, though, as it was fully outfitted for naval combat.

Loewe commanded the long-range Type IXC U-boat on three combat patrols. The young skipper had mediocre results on his second and third patrols, which were conducted off the coast of West Africa and in the Caribbean Sea, respectively. During these patrols, Loewe and his crew torpedoed seven ships and were credited with sinking 37,832 tons. Although he demanded the highest degree of professionalism in the course of their duties from his crew, Loewe was confident and easy-going. He bonded immediately with his crew, and they developed an intense loyalty to him during his three patrols with U-505.

U-505 departed on its second war patrol on 11 February 1942. Loewe and his crew hunted for Allied merchant vessels in the shipping lanes near the deep water port of Freetown, Sierra Leone, near the equator. This area of the Atlantic Ocean offered good hunting for German U-boats as Freetown was a major stop

“U-505 NEVER RECOVERED FROM THE DOWNHILL SLIDE THAT BEGAN WITH THE ROAMAR’S SINKING. NEITHER ITS SECOND CAPTAIN, PETER ZSCHECH, NOR THIRD CAPTAIN, HARALD LANGE, HAD EVEN THE MINOR SUCCESS THAT LOEWE ACHIEVED”

for vessels going to and from the Indian Ocean around the Cape of Good Hope. Loewe sunk four vessels during the 86-day patrol. “Lack of traffic did not permit greater success,” Admiral Karl Dönitz wrote in U-505’s war diary after she returned to Lorient.

U-505 departed on its third war patrol on 7 June. After sinking the American steamers SS Sea Thrush on 28 June and SS Thomas McKean on 29 June just east of the Caribbean Sea, Loewe patrolled along the coasts of Central America and northern South America in a desperate search for more prey.

A BAD MISTAKE

A strange encounter occurred six weeks into U-505’s third patrol when the vessel’s watch spotted a three-masted schooner, Roamar, off the coast of Nicaragua. When it refused to heave to and show its papers, Loewe ordered his crew to fire a warning shot across its bow; however, the shot accidentally knocked over its main mast. The crew ran up the Colombian flag, but still tried to evade the U-boat. Loewe decided to sink it because to leave it damaged would attract the attention of Allied submarine-hunting aircraft. The vessel’s refusal to stop and allow him to inspect its cargo technically gave him the right to sink it even if it ostensibly belonged to a neutral nation. “Sink her... but make it quick,” he told his crew.

The sinking of the Roamar may well have contributed to Colombia eventually declaring

war on Germany that November. U-505 returned early to base due to Loewe’s acute appendicitis. The BdU report on its war patrol stated: “The sinking of the Colombian sailing vessel would have been better left undone.”

U-505 never recovered from the downhill slide that began with the Roamar’s sinking. Neither its second captain, Kapitänleutnant Peter Zschech, nor its third captain, Oberleutnant Harald Lange, had even the minor success that Loewe achieved. By that time in the war, the odds were heavily stacked against Germany’s U-boats. On 4 June 1944, a US Navy submarine-hunting task force cornered U-505 off the coast of West Africa and captured it, ending its troubled life.

■ The conning tower of the U-505 shows shell damage inflicted during its capture in the central Atlantic Ocean



■ U-505 shortly after being captured off the coast of West Africa in June 1944



SABOTAGE AND SUICIDE

U-505’s second captain took his life during a depth-charge attack

U-505’s second captain seemed to have everything going for him. He was intelligent, self-confident and sophisticated and had been mentored by a U-boat ace while serving as an executive officer on U-124. For these reasons, the crew of U-505 had high hopes when Kapitänleutnant Peter Zschech replaced their first captain.

But their collective fortunes soured quickly. “Almost immediately, however, we found out that his aloofness hid an explosive temper,” said Hans Goebeler, a machinist second class on U-505. “His sudden fits of anger and general moodiness contrasted sharply with [Korvettenkapitän Axel-Olaf] Loewe’s calm approach to command.”

On his first patrol with U-505, Zschech sunk only one merchant vessel, the 7,173-ton British steamer Ocean Justice. During that patrol, U-505 suffered an air attack that required six months of repair work at Lorient.

Of the next five patrols, none lasted more than 13 days. German naval authorities later discovered that U-505 had been sabotaged by French underground agents employed as dockyard workers at the Lorient repair facility. The suspected sabotage, which consisted of oil leaks and equipment malfunctions, made U-505 vulnerable to aircraft attacks. The crew blamed Zschech for their misfortunes. He was ridiculed behind his back for his lack of success by both crew and colleagues.

On 9 October 1943, the U-505 set out on its last patrol under Zschech. He was a bundle of nerves by that point. During a severe depth-charge attack on 24 October, he shot himself with his pistol while in the conning tower. The crew buried him at sea the following morning.



■ A prisoner of war, U-505’s third captain Harald Lange convalesces from wounds suffered when a 40mm shell burst next to him during the vessel’s capture

THE CAPTURE OF U-505

THE UNFORTUNATE U-BOAT HAD SUNK EIGHT ALLIED SHIPS IN THE WAR, BUT ON 4 JUNE 1944, IT WAS PAYBACK TIME

Following eleven patrols ranging from moderate success to unmitigated disaster, U-505 would finally meet its end in the most ignominious of circumstances. As it went through the motions on its twelfth official patrol, and under its third captain, of the Battle of the Atlantic, the U-boat would fall prey to a United States destroyer. But far from going out in a blaze of glory, or at least saving face by destroying key documents and tactically scuttling the vessel, the U-boat's crew managed to gift the Americans one of the most important pieces of intel of the conflict. Here we break down the final embarrassment of U-505.

01 ON THE LOOK-OUT

In the summer of 1944, an Edsall-class Destroyer called the USS Chatelain was scouring the Atlantic depths for Axis submarines. The ship had already sunk U-515 on 9 April of that year, so was well versed in submarine destruction.

02 U-BOAT SIGHTING

At 11.10am the USS Guadalcanal began to head to the port of Casablanca for refuelling. It was suddenly stopped in its tracks by the sonar operator of the Chatelain, who had sighted what seemed like a German U-boat.

03 READING ATTACK FORMATION

The sighting proved to be true – the Guadalcanal withdrew as the Chatelain advanced towards the target with support from the Destroyer escorts USS Pillsbury and USS Jenks. A confrontation between them was imminent.

04 OPENING SALVOS

The attack began with a volley of Hedgehogs, a specialised anti-submarine weapon, however, the U-boat was so well concealed that the attacks missed. Two US fighter planes then marked the correct whereabouts of the sub, as the second attack was prepared.

05 STRIKING U-505

With the help of the fighters, the enemy was located and struck with a series of depth charges. Heavily damaged, U-505 was forced to surface – it was now a sitting duck.

06 ATTEMPTED SCUTTLE

With all hope of escape lost, the commanding officer of U-505, Harald Lange, ordered the submarine to be scuttled so the Allies couldn't get their hands on any secret information or technology – namely two Enigma machines.

07 BOARDING U-505

The US navy made it to the submarine just in time – its whole stern was submerged and the waterline had reached the conning tower. The boarding party had to disarm the bombs that were put in place to scuttle the ship. Albert David led them as they collected German code books and documents.

08 NO ONE ABOARD

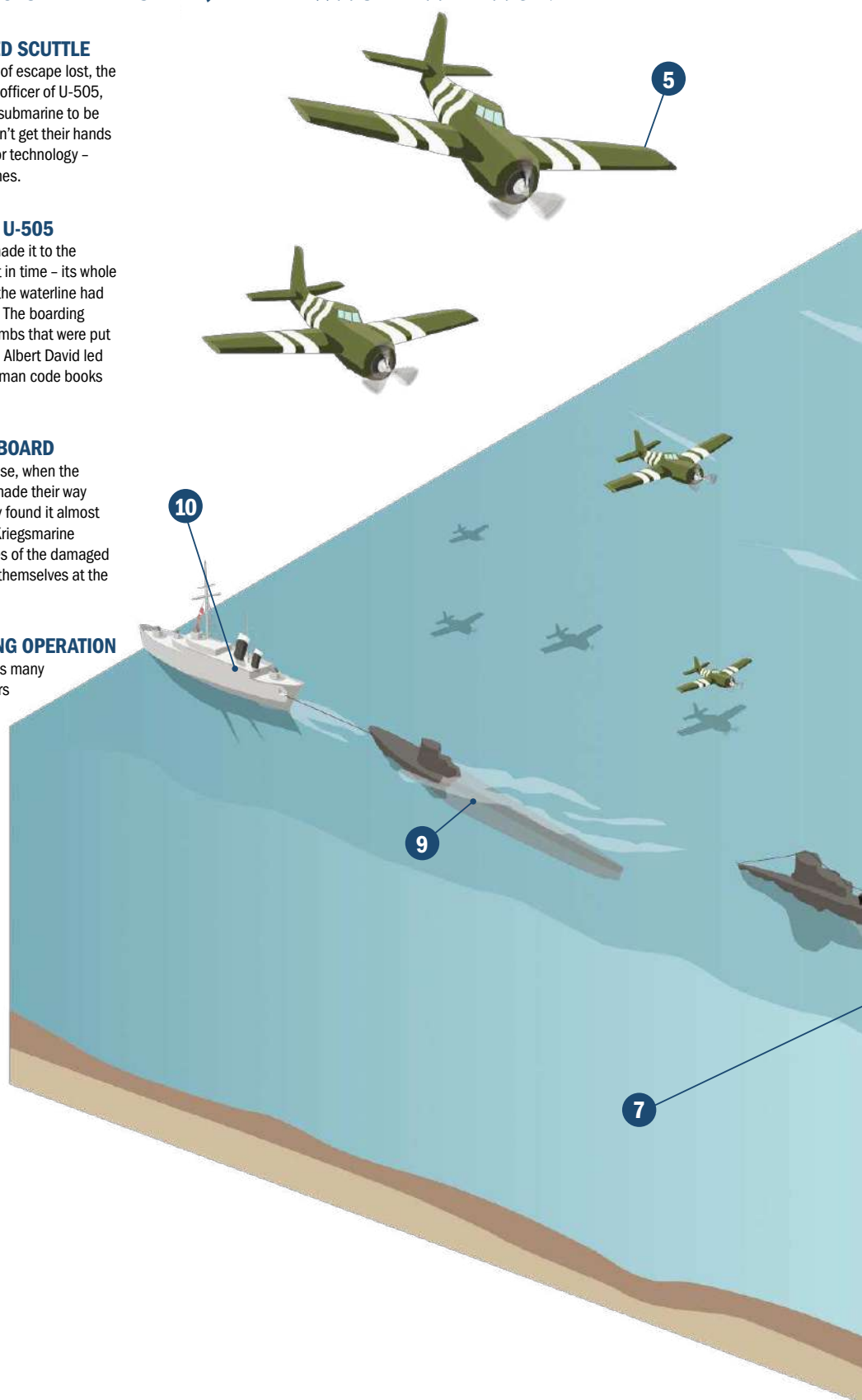
To their surprise, when the US Marines made their way to the German U-boat, they found it almost completely deserted. The Kriegsmarine sailors had fled the confines of the damaged submarine and now found themselves at the mercy of the ocean.

09 THE TOWING OPERATION

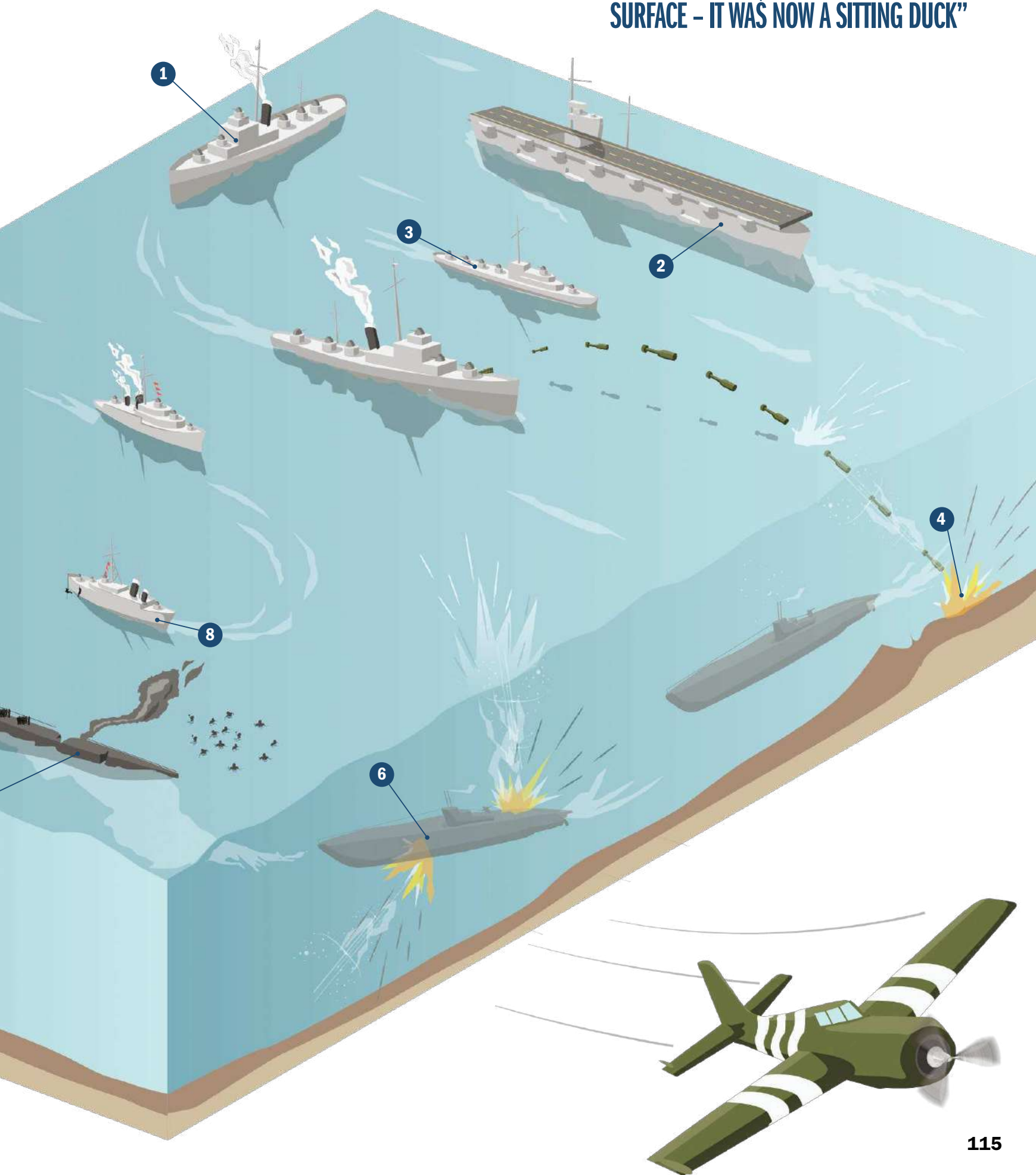
After saving as many German sailors as they could, while simultaneously stopping the submarine from sinking, orders came through that U-505 was to be towed back to US waters for inspection and examination.

10 BACK HOME AND POWS

The towing operation took three days as the Guadalcanal made its way to Camp Ruston, Louisiana. The remaining 58 U-505 crew members were put into the Ruston prisoner of war camp until the end of the war, when they were returned home.



"THE ENEMY WAS LOCATED AND STRUCK WITH A SERIES OF DEPTH CHARGES. HEAVILY DAMAGED, U-505 WAS FORCED TO SURFACE - IT WAS NOW A SITTING DUCK"



HMS MEDUSA

CHARGED WITH PROTECTING BRITISH COASTS FROM THE U-BOAT THREAT, THIS VESSEL ALSO GUIDED ALLIED LANDING CRAFT THROUGH ENEMY MINEFIELDS ON D-DAY



during the course of WWII, over 480 Harbour Defence Motor Launches (HDMLs) were built to defend the United Kingdom's coasts against the German submarine threat. In the early years of the war there was a real fear U-boats could encircle the country and cut off its vital ports and harbours, so these small vessels were intended to build a screen of defence, identifying and sinking any enemy boats. When this threat didn't materialise, the HDMLs were put to work in a whole range of other tasks, such as defending convoys, inserting agents into enemy territory and supporting attacks on islands.

The vessels truly came into their own during Operation Neptune, when they guided allied craft through the deadly enemy minefields of the English Channel on D-Day. In the lead up to the assault, minesweepers carved two channels towards Omaha beach, where American troops would soon be facing some of the toughest resistance of the landings. Vessels ML 1383 and 1387 were positioned as beacons to these channels and would remain

for over 30 hours, guiding the allied craft packed with men and equipment on their way to the beaches of Normandy.

Designed to be small, silent, agile and incredibly flexible, HDMLs weren't intended for longevity. Of the original 480 or so craft, only one remains operational today: ML 1387, now called the HMS Medusa. Built in Poole, UK, in 1943, the Medusa took part in Exercise Fabius in May 1944, which was a practise operation for D-Day, before providing crucial support of the landings themselves.

■ The HMS Medusa, commission in 1943 and built in Poole, UK, served allied ships during the war, guiding them through enemy waters



■ The crew of HMS Medusa, HDML 1397, including Commanding Officer TSLt Arthur Maurice Liddiard RNVR (above). At its current moorings in Gosport, UK. (below)



**“HDMLS WERE PUT TO WORK
DEFENDING CONVOYS, INSERTING
AGENTS INTO ENEMY TERRITORY
AND SUPPORTING ATTACKS”**

ML 1387 ‘HMS MEDUSA’

COMMISSIONED 29 December 1943

CREW 12

LENGTH 72 feet

ORIGIN Dorset, UK

TOP SPEED 12 knots

ENGINE Twin diesel Gardner 8L3s

WEIGHT 54 tons (water displacement)



■ The Chart Room aboard the HMS Medusa, this was where Sub Lt Maurice Liddiard would have outlined the ships involvement in D-Day



OERLIKON 20MM AUTOMATIC CANNON

Each of the two deck-mounted cannons were manned by one gunner strapped in by a harness. This helped the gunner to easily manoeuvre the weapon almost 360 degrees, as well as upward to a nearly fully vertical angle. A safety feature was built into the mechanism of the mount to prevent the weapon rotating a full 360 degrees, as gunners were prone to accidentally damaging their own vessel as they turned and followed their target. The guns carried 60-round magazines, and were capable of delivering 480 rounds per minute. This meant even a brief squeeze of the trigger for just over seconds could expel an entire magazine into the enemy. Bursts of fire like this were ideal against diving Stuka bombers and other aircraft.

■ The manoeuvrability of the 20mm gun made it perfect for levelling fire at both aircraft and targets on the surface



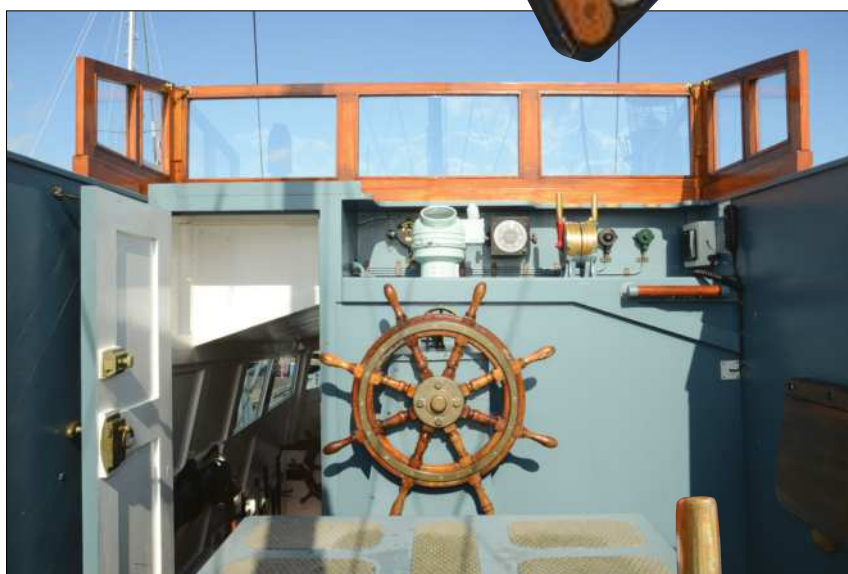
■ Two nearby lockers each contained four extra magazines for reloading the gun



■ Medusa currently has only one 20mm gun, put together from donations and chance findings at scrap yards

TWIN VICKERS 'K' MACHINE GUNS

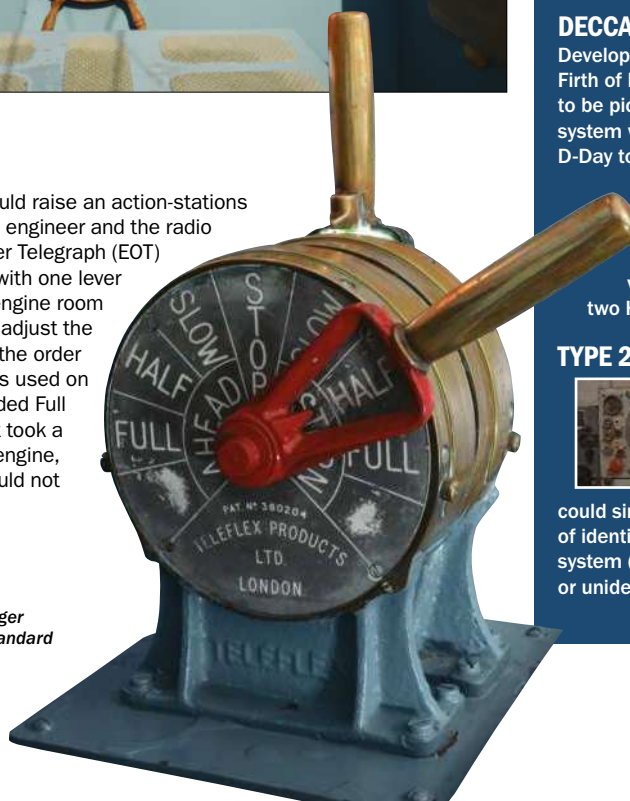
Two twin Vickers machine guns could be mounted on the vessel, one each on the port and starboard sides. These gas-operated guns were each capable of between 900 and 1,200 rounds per minute and were originally developed for the RAF. They were ideal for dealing with enemy aircraft, as well as providing supporting fire.



THE BRIDGE

From here the commanding officer could raise an action-stations alarm, as well as communicate to the engineer and the radio operator below deck. The Engine Order Telegraph (EOT) would deliver orders to the engineer, with one lever for each engine. A bell ringing in the engine room alerted the engineer, who would then adjust the revs of each engine to correspond to the order from the EOT at his end. Just like EOTs used on much larger vessels, the orders included Full Ahead, Stop and Slow, but because it took a small amount of time to adjust each engine, slowing or accelerating the vessel would not have happened instantly.

■ The EOT system was typical of much larger vessels, but was included on HDMLs as standard



ELECTRONIC WARFARE

Medusa was equipped with some most cutting-edge technology



GEE NAVIGATION SYSTEM

Designed for the RAF to improve the accuracy of its bombers, this system was accurate to within a quarter of a mile. Three stations on the shore would send out simultaneous pulses, each of which would be received by the Gee, then the timings between each pulse would determine the location of the vessel. Because it was feared that the Germans would be able to block the signal of the Gee, new transmitters and receiver modules were developed just for D-Day.

DECCA SYSTEM (QM)

Developed in Canada and tested at the Firth of Forth, where it was less-likely to be picked up by the Germans, this system was kept highly secret prior to D-Day to prevent it being jammed. The system was integral to the planning of Operation Neptune, even to the point that ship positions, movements and routes were planned with the Decca signal in mind. Only 20 of these units were used on the most-essential vessels during D-Day and Medusa was only one of two HDMLs to be fitted with one.



TYPE 291 RADAR



This standard-issue radar was adapted from a system used on Sunderland flying boats. Much less-sophisticated than modern-day PPI (Plan Position Indicator) displays, the Type 291 could simply show how far away a target was. It was capable of identifying a destroyer at around six miles away. An IFF system (Indicate Friend/Foe) would also indicate where allied or unidentified objects in the area.



THE ENGINE ROOM

HDMLs were fitted with two diesel engines and one generator to charge the electricity. There would be an engineer manning the engine room at all times, on alternating shifts of 12 hours. Cruising at around 600 revs per minute, the vessel would consume an average of seven gallons of fuel per hour between all three engines. With room to store 1,550 gallons of fuel on board, the vessel could stay at sea for over 2,000 nautical miles. It was the job of the engineer to ensure that fuel was consumed equally between tanks on both the port and starboard sides of the boat, so that the craft remained level and balanced, rather than lopsided.

■ Below: In the event a depth charge was dropped to attack a submarine, the engineer could boost each engine's revs to 900 per minute so the vessel could escape the blast!



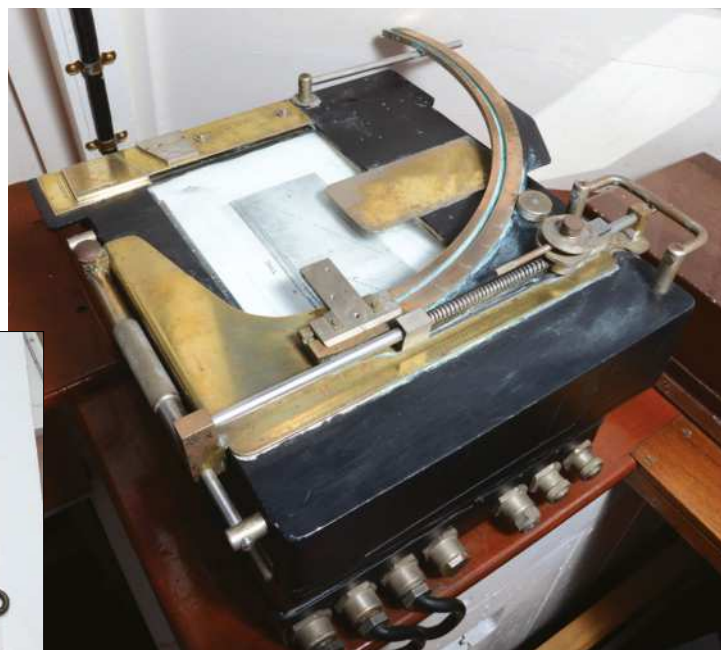
■ Above: The two engines could produce less than 300 horsepower between them – they were built for endurance, not power

■ Below: Engines were regularly swapped out of older and into newer craft by the Admiralty and weren't originally designed to last more than five years



SUBMARINE DETECTION

The original purpose of HDMLs was to seek out and destroy submarines. A large metal dome on the underside of the vessel would send out sonar pings, which would then return back any objects within range. The size and direction of a submarine would be displayed on the automatic graph, and the crew would easily be able to manoeuvre the vessel to pursue it.



■ This box (left) contained a detonator that was to be used by the commanding officer to destroy all the classified equipment on the vessel, if it were at risk of being captured by the enemy

THE WARDROOM

The skipper and first officer occupied this room near the aft of the vessel. Though it was nearly the exact size of the galley area, which housed six of the crew, the two officers occupied this space in relative comfort, complete with an alcohol cabinet, furnishings and the vessel's safe. This safe contained the crew's pay, the captain's orders, side arms, a flare gun and any other sensitive documents. A bell system connected to the galley was also in place, for the officers to call for their meals or other attention from the crew. It was here that refugees hide when they were aboard the vessel.



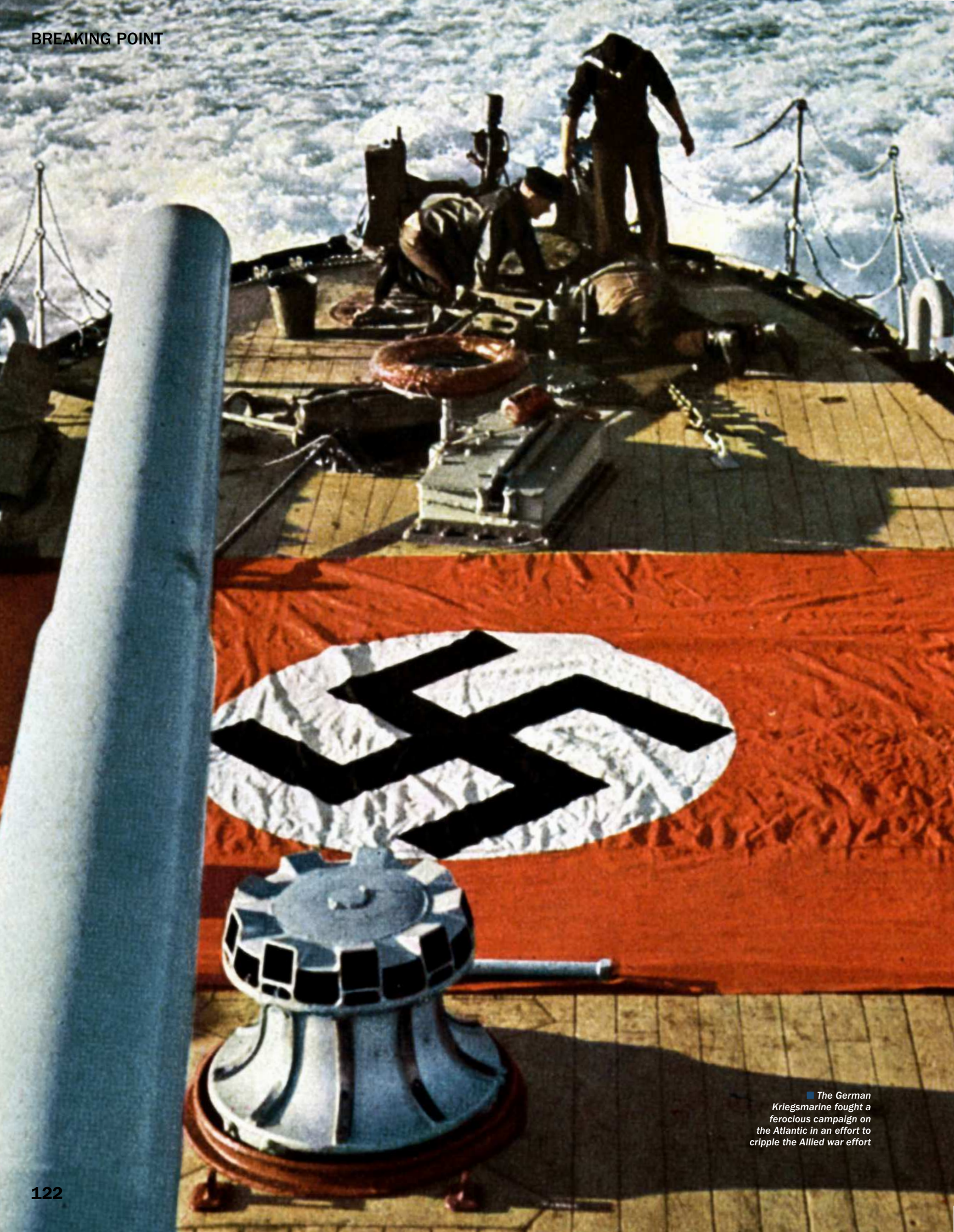
THE MEDUSA TRUST

www.hmsmedusa.org.uk



Set up in 2003, the Medusa Trust worked tirelessly to raise funds for the refit of the vessel, which was in need of drastic restoration work. "In order to do the sort of fundraising we needed to do, she needed to be part of a charitable trust," says Medusa's current skipper and Chairman of the Trust Alan Watson. "The whole purpose of the Trust was to restore, operate and maintain this vessel, but it has broadened slightly. As well as this vessel we're also guardians of the history of all the HDMLs... We are the last crew of the last HDML now, which is a bit special." Along with coxswain and historian of the Medusa, Brian Holmes, the Trust continues to piece together the history of these vessels and the stories of their crew for future generations.





■ The German Kriegsmarine fought a ferocious campaign on the Atlantic in an effort to cripple the Allied war effort

10 DEFINING ENGAGEMENTS: DECIDING THE ATLANTIC

INSTEAD OF A SINGLE CLASH, IT WOULD BE A SERIES OF CRUCIAL ENGAGEMENTS THAT WOULD SETTLE THE BATTLE OF THE ATLANTIC



The carnage of WWII often conjures up images of the most well-known events, such as the Battles of Britain and Stalingrad and the bloody final struggle for Berlin. But arguably the most significant battle of the entire war was the one waged on the Atlantic Ocean.

From the very first days of the war to its bitter end, the belligerents fought ferociously for command of this vital theatre. Predominantly led by the German Kriegsmarine, the Axis

forces knew that victory at sea would cut the vital Allied supply line and strangle Britain. This led them to adopt a policy of unrestricted submarine warfare, as they had done during World War I. It was a ruthless approach that would devastate Allied merchant convoys and warships alike.

For their part, the Allies knew that the only hope of keeping Britain in the fight and opening new fronts in the future rested on winning through. Everything hinged on ensuring that the convoys of merchant ships safely reached their

destinations, be that Britain, the Soviet Union or areas in which Allied forces were already fighting. Their cargo of oil, food, weapons and men would fuel the war. Without them, Germany would continue to maintain its advantage and Britain would eventually be starved into submission.

With the outcome of the war at stake, no quarter could be given. A series of pivotal engagements would see the Battle of the Atlantic swing back and forth as both sides snatched the advantage, only to see their opponent strike back.

1. THE BATTLE OF NARVIK

DATE: 10-13 APRIL 1940

LOCATION: COAST OF NORWAY

UNITS INVOLVED: NUMEROUS SHIPS, INCLUDING:

ALLIED – HMS HARDY, HOTSPUR, HAVOCK, HUNTER AND HOSTILE

AXIS – HERMANN KUNNE, HANS LUDEMANN, WILHELM HEIDKAMP, ANTON SCHMIDT

OUTCOME: HALF OF THE KRIEGSMARINE'S DESTROYERS ARE SUNK

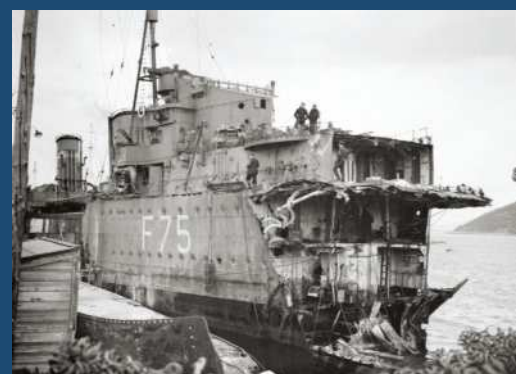
Prior to its stunning invasion of France, Germany set its sights on invading Norway. The neutral Scandinavian nation was seen as vital to the Axis cause as it would allow the U-boats to launch attacks on Allied shipping from Norway's ports and also enable Germany to secure the shipments of iron-ore that reached the port of Narvik from Sweden.

Conversely, the Allies not only wanted to secure the iron-ore for themselves, but also viewed Narvik as a potential site for landing a future expedition to help Finland in the Winter War against the Soviet Union. Should such a landing prevail, the mines of Sweden would be open to the Allies, and potentially the entire Baltic region thereafter. In an attempt to prevent Germany seizing these vital assets and establishing naval bases along the Norwegian coast, the Royal Navy engaged the Kriegsmarine off Narvik as German troops landed on the Norwegian shore as part of a full-scale invasion.

Under the command of Commodore Bernard Warburton-Lee, the 2nd Destroyer Flotilla, comprising five H-class destroyers, succeeded in sinking two German destroyers (killing the German Commodore Friedrich Bonte in the process), inflicting heavy damage on another and light damage on two more. And despite being attacked by three German destroyers as the British ships turned to leave, they managed to sink an ammunition ship and six cargo ships, but paid heavily with the loss of both HMS Hardy (on which Warburton-Lee died) and HMS Hunter.

Seeing an opportunity to finish off the stricken German ships and reclaim control of Narvik harbour, the Royal Navy returned to the area on 13 April in

■ A torpedo strike on HMS Eskimo destroyed the ship's bow



the form of the battleship HMS Warspite and nine destroyers. Low on fuel and running out of ammunition, the eight German destroyers left in the Ofotfjord were virtually stranded.

Prior to this second engagement, Warspite's catapult plane had sunk U-64, the only time in the entire war when an aircraft launched from a battleship succeeded in downing a German submarine. In the battle that followed, three German destroyers would also be sunk, and the remaining five scuttled as the Royal Navy demolished its opponents, receiving damage to three of its destroyers in return, HMS Eskimo forced to remain in Norway until 31 May following the loss of its bow.

In a further boost for the Allies, Warspite also succeeded in damaging coastal batteries. All in all, the Germans lost approximately 1,000 men, and with their shipping losses from both battles combined, around 50 per cent of the Kriegsmarine's destroyers.

In a sign of the total misfortune that befell the Kriegsmarine, the torpedoes fired at Warspite as it departed on 14 April failed to detonate. However, due to the lack of a landing force, the Allies could not capitalise on their naval supremacy, and Norway fell.

2. ATTACK ON CONVOY HX-72

DATE: 20-22 SEPTEMBER 1940

LOCATION: WESTERN APPROACHES

UNITS INVOLVED: A LARGE WOLF PACK, INCLUDING U-32, U-38

U-43, U-47, U-48, U-65, U-99 AND U-100

OUTCOME: 11 ALLIED SHIPS SUNK FOR NO GERMAN LOSSES

The 43 ships that comprised convoy HX-72 departed Halifax, Canada for Liverpool on 9 September 1940. Carrying vital war materials, it was accompanied by five escort ships, but even this precaution couldn't save it.

Fatefully, as the convoy continued its voyage towards Britain, its ocean escort, the AMC Jervis Bay, detached to meet up with a convoy heading west on 20 September. This manoeuvre left the convoy virtually unprotected, for it wasn't scheduled to link up with its Western Approaches convoy until the following day. It proved to be an opportunity too good to miss for the lurking U-boats.

U-47, under the command of the renowned Günther Prien, spotted the doomed convoy and reported it to the U-boat Control, which promptly summoned the U-boats in the immediate vicinity. Several heeded the call to form a wolf pack, including U-99 and U-65.

In a series of perfectly executed assaults that began with U-99 torpedoing the Invershannon at midnight on 20 September, the U-boats ravaged the convoy. Despite Commodore H H Rogers' attempts to shake off their assailants, the U-boats continued to take it in turns to attack. Even the arrival of the Western Approaches escort did not deter the onslaught, U-100 audaciously entering the convoy to attack at close range. The convoy soon scattered in confusion and panic.

Just as swiftly as they had arrived, the U-boats slipped below the waves. Of the 43 ships that had set out from Canada, the wolf pack had sunk 11 without suffering a single loss.

“IN A SERIES OF PERFECTLY EXECUTED ASSAULTS THAT BEGAN WITH U-99 TORPEDOING THE INVERSHANNON, THE U-BOATS RAVAGED THE CONVOY”

■ Günther Prien, scourge of many an Allied ship, was the first U-boat commander to receive the Knight's Cross



3. THE BATTLE OF DENMARK STRAIT

DATE: 24 MAY 1941
 LOCATION: DENMARK STRAIT
 UNITS INVOLVED: ALLIED – HMS PRINCE OF WALES AND HMS HOOD
 AXIS – PRINZ EUGEN AND BISMARCK
 OUTCOME: SINKING OF HMS HOOD AND MAJOR DAMAGE TO THE BISMARCK

Despite its formidable reputation, the infamous Bismarck battleship only conducted one offensive operation in WWII. Codenamed Rheinübung, the operation was intended to result in the Bismarck and the heavy cruiser Prinz Eugen breaking into the North Atlantic to raid merchant shipping en route to Britain. But it was to be a short-lived venture.

After being detected on numerous occasions by the Royal Navy off the Scandinavian coastline, the two German ships were engaged by HMS Prince of Wales and HMS Hood in the Denmark Strait on 24 May 1941. In a ferocious two-on-two battle, the British committed the fatal mistake of sending both of its ships to confront one enemy each.

Approaching head-on, and therefore only able to fire from their forward guns, the British ships were immediately at a disadvantage as

the Bismarck and Prinz Eugen hammered them from all angles. The German ships quickly concentrated their fire on the Hood, one of the Eugen's eight-inch shells igniting a blaze aboard its target.

But it would be the Bismarck that would add the coup de grace, sending a 38-centimetre armour-piercing shell into the Hood's rear ammunition hold, which stored 112 tons of cordite propellant. The resulting explosion broke the back of the Hood and sank it, killing over 1,400 on board.

The Prince of Wales was soon forced to retreat, but not before it inflicted such extensive damage on the Bismarck that it had to abandon any future operations. The loss of HMS Hood would prove to be the Bismarck's undoing. The Royal Navy was now hell-bent on revenge.



“IT WOULD BE THE BISMARCK THAT WOULD ADD THE COUP DE GRACE, SENDING A 38-CENTIMETRE ARMOUR-PIERCING SHELL INTO THE HOOD'S REAR AMMUNITION HOLD”

■ Enraged by the loss of HMS Hood, the Royal Navy sent a fleet of ships to hunt down the Bismarck

4. SINKING THE BISMARCK

DATE: 26-27 MAY 1941
 LOCATION: ATLANTIC OCEAN
 UNITS INVOLVED: ALLIED – ATTACKING UNIT INCLUDING HMS ARK ROYAL, RODNEY, KING GEORGE V, DORSETSHIRE AND SHEFFIELD
 OUTCOME: THE BISMARCK IS SUNK

Immediately after its sinking of HMS Hood, the Bismarck found itself pursued by an enraged Royal Navy. With the battleship King George V and the carrier Victorious hot on its trail, the wounded Bismarck needed to get to the safety of a port if it was going to survive. Initially it seemed like it would, as a squadron of Swordfish torpedo-bomber aircraft took off from the Victorious to attack the Bismarck, only to fail to land a significant blow. And despite the Bismarck being tailed by the ships Norfolk, Suffolk and Prince of Wales, the Royal Navy lost contact with its quarry.

Fortunately for the British, Admiral Günther Lütjens, commanding the Bismarck, made the bizarre decision to radio Hitler to inform him of his contact with the Hood. The British picked up the signal and, despite initially failing to grasp the whereabouts of the Bismarck, quickly set about homing in.

Refuelled, the Swordfish returned and scored two major hits, one of which jammed the Bismarck's rudders and obliterated its steering gear. The stricken ship began to sail around in circles as night descended. But even the darkness offered little comfort as British destroyers continued to harass it.

On the morning of 27 May, the Royal Navy finished the job. HMS Rodney opened fire, followed by King George V. The Bismarck fought back valiantly but by 10am all its main guns had fallen silent. The salvos continued, wrecking its secondary armaments too. At 10.15am, HMS Dorsetshire downed the Bismarck with three torpedoes.

■ British warships took 111 survivors of the Bismarck back to Britain, where they remained as prisoners of war



5. THE DESTRUCTION OF PQ-17

DATE: JULY 1942

LOCATION: ARCTIC OCEAN

UNITS INVOLVED: ALLIED – CONVOY PQ 17

AXIS – U-456, LUFTWAFFE

OUTCOME: 24 OUT OF 35 MERCHANT SHIPS LOST

Described by Winston Churchill as one of the “most melancholy naval episodes in the whole of the war”, the loss of much of convoy PQ-17 was a crushing blow to the Allies and resulted in the temporary suspension of the Arctic convoys supplying the Soviet Union.

Soon after setting sail from Hvalfjörður, Iceland convoy PQ-17 was picked up by German forces and relentlessly attacked. The British admiralty kept a keen eye on the convoy's troubled progress (it was the first joint Anglo-American naval operation under British command) and upon hearing reports that German ships were heading for the convoy, Admiral Dudley

Pound ordered the escorts to leave the convoy and intercept the would-be attackers and requested the convoy itself scatter. It would be a decision with tragic consequences.

Shorn of its protectors and strung out across a vast swathe of the ocean, PQ-17 was now easy prey. As the escorts searched for a German attack that never came, Luftwaffe aeroplanes and U-boats mauled the merchant ships as they desperately tried to reach their allocated Russian ports. The 11 that did make it supplied the Soviets with 64,000 tons of cargo.

Ironically, this valiant effort actually led to a disagreement between the Allies, as the Soviets could not accept that so many ships had been sunk in one convoy, and accused the British and Americans of lying. It wasn't until September that the Allies dared to attempt another Arctic convoy, sending 16 destroyers alongside it when they did.

“LUFTWAFFE AEROPLANES AND U-BOATS MAULLED THE MERCHANT SHIPS AS THEY DESPERATELY TRIED TO REACH THEIR ALLOCATED RUSSIAN PORTS”

■ The destruction wrought on convoy PQ-17 forced the Allies to revise their methods

6. BATTLE OF THE BARENTS SEA

DATE: 31 DECEMBER 1942

LOCATION: BARENTS SEA (OFF NORWAY)

UNITS INVOLVED: ALLIED – CONVOY JW 51B, SIX BRITISH SHIPS INCLUDING HMS SHEFFIELD AND JAMAICA
 AXIS – ADMIRAL HIPPER, LUTZOW, FRIEDRICH ECKOLDT, RICHARD BEITZEN, THEODOR RIEDEL, Z29, Z30 AND Z31

OUTCOME: HITLER ORDERS THE GERMANY NAVY TO FOCUS ON ITS U-BOAT FLEET RATHER THAN SURFACE SHIPS



■ The loss of the Friedrich Eckoldt and failure to damage convoy JW-51B led Hitler to rethink Germany's naval strategy

The Battle of the Barents Sea on New Year's Eve 1942 resulted in a major strategic change for the Germany Navy, the result of its surface unit's failure to sink any of the merchant ships in convoy JW-51B.

Consisting of 12 merchant ships and eight warships, JW-51B was another convoy bound for the Soviet Union. At around 8.20am on 31 December 1942, three German destroyers were sighted to its rear. Accompanied by another three destroyers and two heavy cruisers, the Germans were confident of inflicting more losses on Allied shipping. But they hadn't counted on the guile of Captain R Sherbrooke.

Outgunned and with the enemy closing in, Sherbrooke feigned a torpedo attack, forcing the German ship Admiral Hipper to briefly retire, buying time for the convoy. In the clumsy battle that ensued, in which German and British ships mistook each other for allies at certain chaotic intervals, HMS Bramble went down with all on board before the German destroyer Friedrich Eckoldt was broken in two following a barrage from HMS Sheffield, having mistakenly thought it was approaching the Admiral Hipper.

The entire convoy managed to escape and reach their intended destinations. But the real significance of this victory was not immediately apparent. Infuriated by the surface ships' inability to sink any of the convoy, Hitler came close to ordering the scrapping of the entire German surface fleet. A crestfallen Admiral Erich Raeder resigned and was replaced by Karl Dönitz. Germany would only conduct one more major surface operation for the rest of the war.

7. ATTACK ON CONVOYS HX-229 AND SC-122

DATE: 16-19 MARCH 1943

LOCATION: NORTH ATLANTIC

UNITS INVOLVED: AXIS – U-BOAT UNITS RAUBGRAF, STÜRMER AND DRÄNGER

ALLIED – HMS MANSFIELD, HIGHLANDER, VIMY, ABELIA, USS BABBITT AND USCGC INGHAM

OUTCOME: 22 SHIPS SUNK IN LARGEST NORTH ATLANTIC U-BOAT ATTACK OF THE WAR

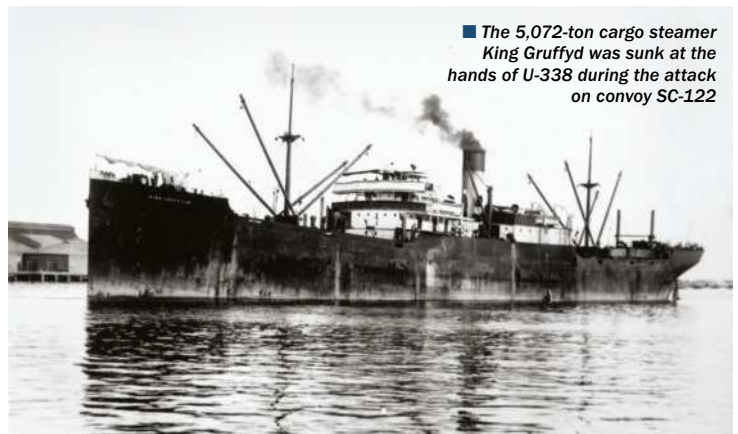
March 1943 proved to be the crisis point of the entire Battle of the Atlantic for the Allies. Billed by German radio as the 'greatest convoy battle of all time', the clash between 38 German U-boats and the 100 ships of convoys HX-229 and SC-122, along with their escorts, pushed some on the Allied side to no longer consider convoys as effective methods of defence, such was the apparent German superiority at sea.

Both eastbound convoys embarking from New York, HX-229 and SC-122 were unfortunate to be at sea just when the Allied code breakers at Bletchley park went 'blind'. The German's introduction of a new short weather report denied them the information needed to break the U-boat's cipher machines, meaning that, unlike previously, the convoys could not easily be diverted away from danger. Convoy SC-122 only managed to avoid the estimated danger zone after a U-boat signal was picked up.

Conversely, the Germans had broken the Allied Cipher Number 3, enabling them to accurately intercept HX-229. Spotted on the morning of 16 March by U-653, the ill-fated convoy was targeted by the German Raubgraf U-boat wolf pack while other wolf packs Stürmer and Dränger raced ahead to cut it off. By the following morning, the Raubgraf pack had sunk eight ships, downing them at a rate of one an hour.

It was then the turn of SC-122, which fell victim to the torpedoes of U-338, the German submarine sinking four ships and damaging a fifth that was sunk later. A brief respite afforded by some spirited escorts and long-range aircraft followed, but by nightfall the freighter Granville went under, swiftly accompanied by two more ships. U-221 got in on the act on the afternoon of the 18 March, sending two of convoy HX-229's ships to the bottom of the ocean.

Help eventually arrived in the shape of destroyers sent from Iceland, and bar the odd straggler, the horrific losses were finally stemmed. All attacks were repelled thereafter and both convoys received further reinforcement on 19 March. On the same day, a small measure of revenge was achieved when an air patrol sank U-384. Not wanting to risk any further losses, Admiral Dönitz finally called off his wolves, the biggest North Atlantic wolf pack attack of the war. They had inflicted tremendous damage. A total of 22 ships, equating to 146,000 tons of supplies, and over 300 seamen had been lost.



■ The 5,072-ton cargo steamer King Gruffyd was sunk at the hands of U-338 during the attack on convoy SC-122

8. THE BATTLE OF THE NORTH CAPE

DATE: 26 DECEMBER 1943

LOCATION: OFF NORTH CAPE, NORWAY

UNITS INVOLVED: HMS BELFAST, NORFOLK, SHEFFIELD AND DUKE OF YORK, CRUISER JAMAICA, FOUR DESTROYERS, SCHARNHORST

OUTCOME: THE GERMAN BATTLESHIP SCHARNHORST IS SUNK WITH THE LOSS OF 1,900 LIVES

In a cruel twist of irony, Hitler's condemnation of the German surface fleet played a huge role in sinking another of its vessels, thereby seemingly reinforcing the Führer's low opinion of them.

On Christmas Day 1943, the battleship Scharnhorst embarked from Norway intent on wreaking havoc on the Arctic convoys headed for the Soviet Union and consequently disproving their supreme leader's view that the surface fleet was a spent force. But unlike the many previous attacks launched during the Battle of the Atlantic, this one could not hope to rely on the element of surprise. In fact, the British were actively awaiting its arrival, and even placed two convoys as bait in the trap. Breaking the German naval codes had proven to be a massive advantage.

Comprised of Force One (HMS Belfast, Norfolk and Sheffield) and Force Two (HMS Duke of York and the cruiser Jamaica, plus four destroyers), the Royal Navy ships were primed to down the 'Lucky' Scharnhorst, as it was affectionately known in Germany.

At just an hour away from the Murmansk-bound convoys, the Scharnhorst was completely taken by surprise when HMS Norfolk blew its radar to pieces. The German ship fired back, damaging its attacker, before attempting to flee for the sanctuary of Norway, shedding its escorts to maintain speed. It was a valiant effort, but ultimately in vain, for another four British ships joined the fray and, despite managing to damage HMS Saumarez, the Scharnhorst was soon sent to the bottom of the ocean by 11 accurate torpedoes.

“THE SCHARNHORST WAS COMPLETELY TAKEN BY SURPRISE WHEN HMS NORFOLK BLEW ITS RADAR TO PIECES”



■ Blindfolded, the few survivors of the Scharnhorst come ashore at Scapa Flow

9. OPERATION STONEWALL

DATE: DECEMBER 1943
 LOCATION: NORTH ATLANTIC
 UNITS INVOLVED: ALLIED – BRITISH, AMERICAN, CANADIAN, FRENCH AND NEW ZEALAND SHIPS; AMERICAN, BRITISH AND CZECH AIRCRAFT
 AXIS – T25, T26 AND Z27
 OUTCOME: SINKING OF THREE GERMAN DESTROYERS IN BAY OF BISCAY



■ HMS Glasgow and Enterprise worked in tandem to savage German destroyers protecting ships attempting to evade the Allied blockade

“AS ALLIED SHIPS CONVENED TO INTERCEPT THE FLOTILLA, A CZECH AIRCRAFT SQUADRON BEGAN TO BOMBARD THE GERMANS”

From the very start of the war, the Allies had deemed a naval blockade on German imports as strategically imperative to the war effort. Codenamed Operation Stonewall, it didn't become an organised, cooperative effort until 1943, but despite this, few German ships (blockade runners) embarked on successful voyages.

On 23 December 1943 the USS Card sighted a German runner and further reports of a flotilla began to come in. As Allied ships from numerous nations convened to intercept the flotilla, which was escorting merchant ships off the west coast of France, a Czech aircraft squadron began to bombard the Germans. The SS Alsterufer went up in flames, and the destroyers that had set out to assist it met similar misfortune on 28 December.

Opting to split into two groups and make a dash for safety proved a fatal error, and HMS Enterprise and Glasgow didn't fail to grasp their opportunity, pursuing one of the groups relentlessly. By 4pm three German destroyers (T25, T26 and Z27) had been successfully sunk, and although the merchant ship SS Osorno limped away, it soon ran aground on a wreck, forcing it to offload away from the shoreline.

To compound the misery for the Axis ships, the Allies correctly anticipated the arrival of additional blockade runners in the coming days. Between 3-5 January 1944, US patrols sank another three vessels in the South Atlantic. These would prove to be the final runners, for the Germans soon lost control of their French ports following the Normandy landings on D-Day.

10. BATTLE OF USHANT

DATE: 9 JUNE 1944
 LOCATION: ENGLISH CHANNEL
 UNITS INVOLVED: GERMAN 8TH DESTROYER FLOTILLA AND BRITISH 10TH DESTROYER FLOTILLA
 OUTCOME: BRITISH FINISH OFF THE REMNANTS OF THE GERMAN 8TH FLOTILLA

As the Allied invasion fleet fought to secure a foothold on the beaches of Normandy on 6 June 1944, the remaining ships that comprised the German 8th destroyer flotilla set sail from Gironde in southwest France for Brest in the northwest. Somehow they made it to their destination despite the Allies intercepting their radio signals and lightly damaging the destroyer Z32.

However, they were not so fortunate upon their return journey, this time headed for Cherbourg intent on supporting the besieged German troops. With the British able to read into the German's movements yet again thanks to their cracking of Ultra, Captain Basil Jones led the 10th flotilla to attack them.

In the early hours of 9 June, the German ships were spotted 30 miles off the island of Ile de Batz, Brittany. Jones promptly wheeled his fleet around to confront them, initiating a series of clashes. In the brutal exchange of gunfire and torpedoes, HMS Tartar sustained damage, its crew rushing to extinguish the fires that sprang up on board. But Tartar managed to return fire and, alongside the HMS Ashanti, succeeded in blowing the bows off ZH1.

With no hope of salvaging the stricken ship, ZH1's skipper Klaus Barckow ordered it abandoned before scuttling the ship with depth charges. It would be his last action, Barckow perishing along with 38 others as ZH1 slipped below the waves.

As ZH1 had conducted its final battle, the Canadian ships Haida and Huron had been chasing down Z24 and T24. Gaining on their targets, they suddenly lost the initiative as the Germans slipped into a British minefield, where they regrouped before departing. But the Canadians were not to be denied, redirecting their wrath on Z32, itself heavily damaged.

Once the Allied vessels had established the true identity of Z32, they unleashed a volley of fire. The Germans turned and fled but couldn't make it to safety, instead driven ashore and wrecked. The German 8th flotilla was finally shattered, and Germany's surface fleet never recovered from this final execution of Allied superiority.

This engagement off the French coastline proved to be one of the last key battles in the war on the Atlantic. With the Germans rapidly losing ground in the face of an irresistible Allied invasion, their hold of the strategically critical

western ports was relinquished, making future excursions incredibly difficult to conduct.

Even so, the German navy remained a thorn in the Allied side until the final bitter days of the war. In January 1945, U-825 attacked convoy HX-332, sinking the Solør. This was then followed up by U-1302 torpedoing Novasli and King Edgar from convoy SC-167, and in the penultimate month of the war, U-1107 sank Empire Gold and Cyrus H McCormick of convoy HX-348.



■ HMS Tartar, the flagship of the British 10th destroyer flotilla, saw service in most of the naval theatres of WWII

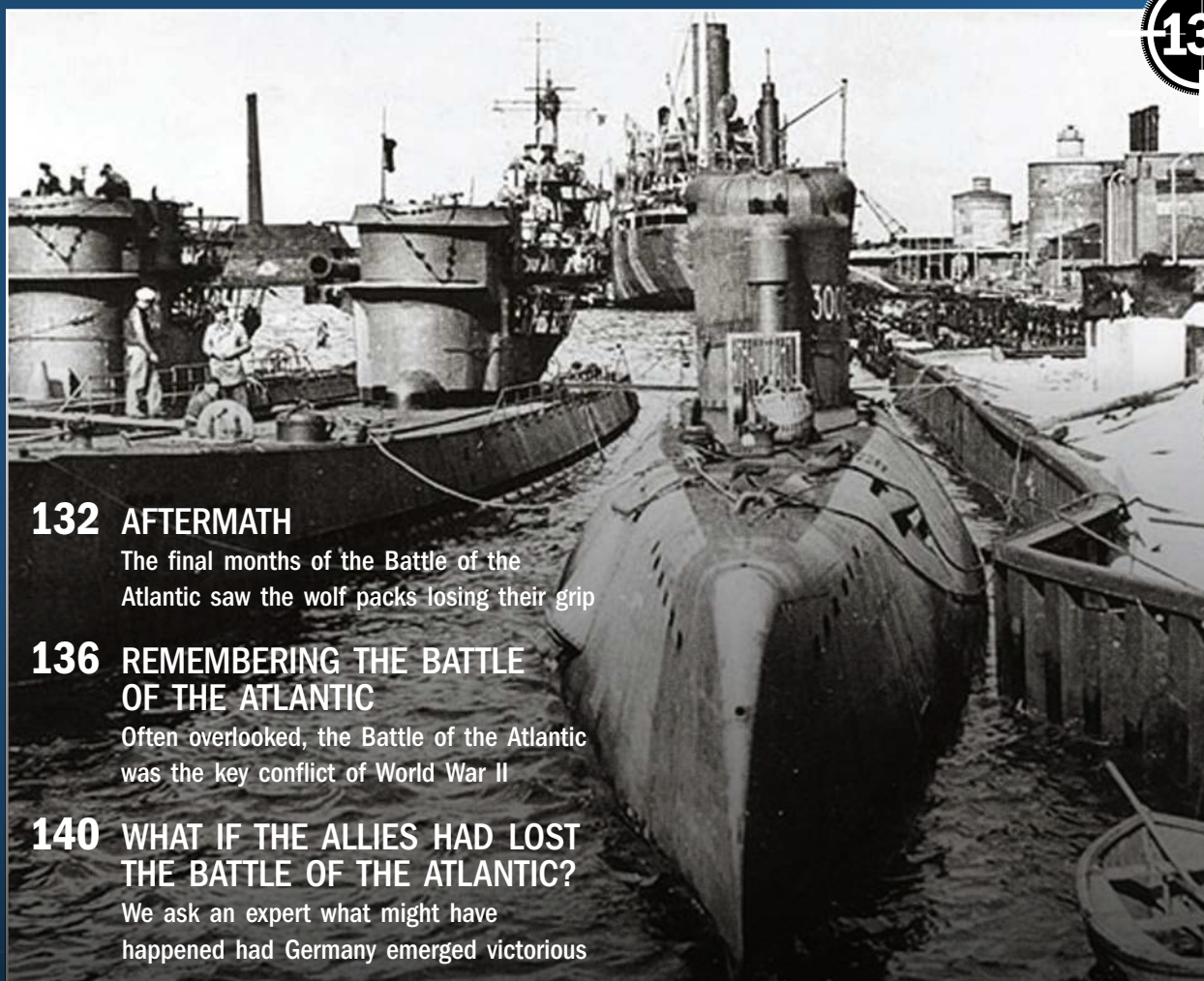


THE PRICE OF VICTORY

ULTIMATELY, THE ALLIES WERE TRIUMPHANT IN THE BATTLE OF THE ATLANTIC, BUT THIS VICTORY CAME AT IMMENSE COST



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The final months of the Battle of the Atlantic saw the wolf packs losing their grip

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Often overlooked, the Battle of the Atlantic was the key conflict of World War II

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We ask an expert what might have happened had Germany emerged victorious



“A COMBINATION OF COMPLEXITY AND SECRECY HAS PERHAPS CONSPIRED TO KEEP THE BATTLE OF THE ATLANTIC’S IMPORTANCE IN THE SHADOWS... WITH EACH PASSING YEAR, HOWEVER, THE PIVOTAL ROLE THAT IT PLAYED IN DEFEATING GERMANY BECOMES CLEARER”



AFTERMATH

DURING MAY 1943, DÖNITZ WITHDREW HIS U-BOATS FROM THE NORTH ATLANTIC. BUT HE HAD NOT YET CONCEDED THE BATTLE



With the benefit of hindsight, we can now with ample justification conclude that May 1943 marked the point at which Germany lost the Battle of the Atlantic. However, at that moment in time, defeat was far from Dönitz's mind. He had ordered a 'temporary withdrawal' of his

U-boats from the North Atlantic in the face of overwhelming enemy military and technological power which had caused severe losses to his own men for meagre success in return. Nonetheless, May 1943 was considered a crisis within U-boat command, not a rout.

Dönitz had become Großadmiral and Kriegsmarine commander-in-chief at the end of January 1943 following Erich Raeder's resignation. Though he remained head of the BdU, his immediate deputy Eberhard Godt (BdU Ops) handled full tactical control of the U-boat war as Dönitz's responsibilities widened. BdU headquarters had relocated on Hitler's orders from Lorient to Paris in March 1942 after the British commando raid on St Nazaire showed Dönitz and his staff to be vulnerable in such a frontline location as Kernével, Lorient. Inside their Paris headquarters in mid-1943, there was considerable optimism that the Atlantic offensive would be resumed, reinvigorated by the application of long-delayed technological advances.

Great faith was placed in improved radar, radar-decoy and radar-detection equipment, improvements in cooperation between U-boats and Luftwaffe maritime aircraft, enhanced flak weaponry and ammunition, and the introduction of 'destroyer-killer' torpedoes. The latter were G7es TV torpedoes named Zaunkönig (wren). A passive homing apparatus of two hydrophone receivers tracked the high-pitched propeller noise of an escort, controlling the torpedo's rudder, and guided a standard contact or magnetically fused electric torpedo. This was not the first such 'homing torpedo' introduced by the Kriegsmarine, the TIV Falke (falcon) entering service in March 1943 for use against merchant ships. Combined with improved weaponry, an increasing number of U-boats were being commissioned; 286 entering service during 1943 – the highest yearly number – as Albert Speer, Hitler's armaments minister, took control of production and initiated a long-awaited construction drive. In gestation was also the jewel in the U-boat service's crown: a theoretical 'electro-boat' that could outperform any known submarine and which was nearing the completion of its preliminary design stage.

On 1 May 1943, in an effort to combat the Allied aerial menace, Dönitz issued Standing War Order (Ständiger Kriegsbefehl) 483 in which he exhorted U-boats equipped with improved flak weapons to stay surfaced and fight back against enemy aircraft rather than expose themselves to attack during the crucial seconds that it took to dive the U-boat to escape and in which guns were unmanned. Specially equipped 'flak boats' that carried substantially expanded anti-aircraft weaponry were also introduced as potential traps for unwary aircraft. Despite a few successes, the experiment failed. The order remained in effect until August and 26 U-boats were lost, a further 17 forced to abort their mission with damage and casualties.

RETURN TO THE NORTH ATLANTIC

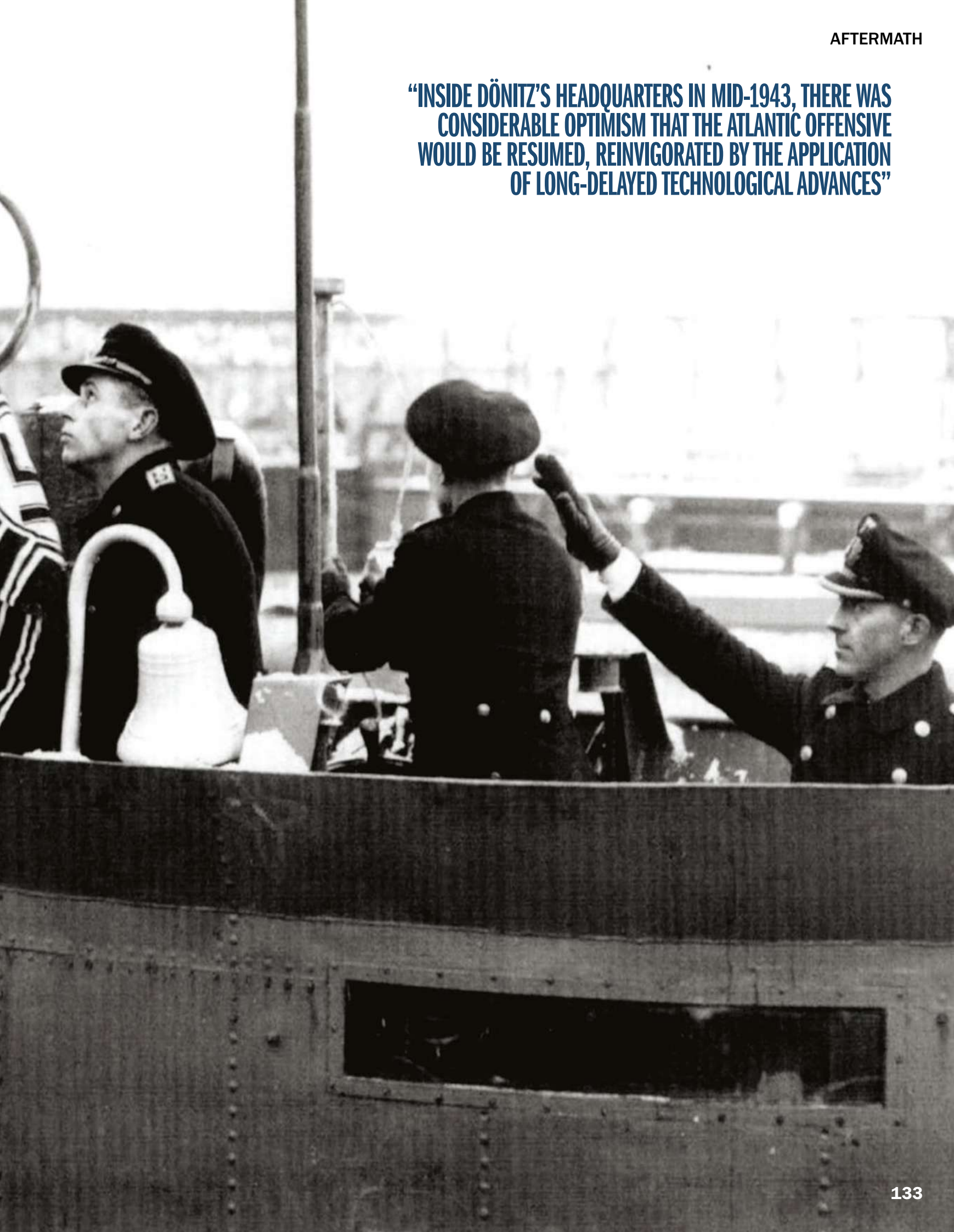
As the North Atlantic had been virtually abandoned by U-boats, quantities of Allied escort ships were released for extended operations into remote areas where Dönitz had despatched his forces. So-called 'Hunter-Killer' groups were formed, centred around aircraft carriers, and began to achieve successes against U-boats further afield, guided by their own direction finding and radar equipment as well as top-secret ULTRA decryption of coded German messages. Aircraft continued to hammer Dönitz's boats entering and leaving harbour and losses were heavy.

Finally, in September, the G7es TV torpedoes were ready for use from the French bases and Dönitz sent a new group of 21 boats named 'Leuthen' to form a patrol line south of Greenland. There they would meet the combined westbound ONS-18 and ON-202 convoys from Liverpool, brought together by the admiralty who had become aware of the U-boat group's presence. In total, 65 merchant ships were under escort by 19 warships as the first torpedo was fired by U-270 on 20 September. Oberleutnant zur See Paul-Friedrich Otto fired a TV Zaunkönig at frigate HMS Lagan, the torpedo homing on the propeller and hitting the ship's stern. Though U-270 was driven away, Lagan was forced to leave the convoy under tow from HMS Destiny, bound for Liverpool where she was later declared a total constructive loss. During the battle that followed, U-boats claimed 12 escorts and nine merchants sunk with a further two badly damaged. They actually sank three escorts and six merchants, with one other damaged. In return, three U-boats – U-341, U-338 and U-229 – were sunk and three forced to return to France damaged.

■ A Type XXIII is commissioned in Germany. These small coastal 'electro-boats' carried only two torpedoes which could only be reloaded externally while in harbour



“INSIDE DÖNITZ’S HEADQUARTERS IN MID-1943, THERE WAS CONSIDERABLE OPTIMISM THAT THE ATLANTIC OFFENSIVE WOULD BE RESUMED, REINVIGORATED BY THE APPLICATION OF LONG-DELAYED TECHNOLOGICAL ADVANCES”



THE TYPE XXI ELECTRO-BOAT

A sophisticated and ambitious new concept in submarine warfare

A primary limitation of operational U-boats between 1939 and 1944 was their inadequate capability while running submerged. They were, in effect, not true submarines, but instead 'submersibles'. This important distinction meant that they were designed to operate surfaced wherever possible and submerge only when absolutely necessary. When underwater, their endurance was limited; once their electric batteries were exhausted, they would be forced to surface or the propellers would cease to turn and the U-boat would sink in the water column. By contrast, the so-called 'electro-boat' was specifically designed to operate for lengthy periods submerged.

Its development followed unsuccessful attempts by Professor Hellmuth Walter to develop a U-boat that could be driven by hydrogen peroxide for high submerged speed and durability. Using aspects of his craft's streamlined hull design, Kriegsmarine engineers planned the Type XXI U-boat that would use huge battery capacity – triple that of a Type VIIC – to power a U-boat that could operate submerged for long periods and make short sprints at speeds that could match, and in some cases better, that of surface escorts. Coupled with this was an underwater endurance of 340 nautical miles on a single charge, compared to 80 nautical miles at a comparable low speed for the Type VIIC. Rated to a maximum depth of 240 metres, the boat could fire torpedoes at a greater depth than its predecessors, an electric reloading system capable of allowing 18 torpedoes to be fired within 20 minutes.

Many veteran U-boat commanders were recalled to active service and given command of a Type XXI. During September 1944, Korvettenkapitän Adalbert 'Adi' Schnee took command of U-2511, which mounted the first and only combat patrol by a Type XXI. Departing Bergen on 3 May 1945, he sighted a group of British warships and approached to within 500 metres of cruiser HMS Norfolk before withdrawing undetected: Dönitz having used the cease-fire order to U-boats only hours before.

Was the Type XXI U-boat a war-winning weapon? Not by that stage of the conflict. It did, however, pave the way for post-war submarine development along previously unexplored lines as the victorious powers took surviving boats as prizes of war and conducted their own extensive trials.

■ The Type XXI U-3008 in Wilhelmshaven harbour after Germany's surrender. The U-boat number has been painted on the conning tower by British forces



The British admiralty claimed the battle a success. Despite the relatively heavy loss, the vast majority of the convoy had safely reached their destination and the potential U-boat threat had been mastered again. Knowledge of the Zaunkönig soon led to introduction of the 'Foxy' towed decoy that attracted the torpedo's sensors, negating their effectiveness, though the decoys broadcasted so much noise that they sometimes attracted U-boats to a convoy they had not previously detected. On the German side, BdU also claimed success, buoyed by the exaggerated claims which were, somewhat ironically, caused by the operational use of the Zaunkönig. The TV torpedo armed itself at a range of only 250m from the firing boat and therefore commanders were under orders to fire and then dive, lest it circle and home in on the U-boat's own propellers. Unable to therefore observe the results, they were unaware that the torpedo was prone to premature detonation and frequently claimed a hit where there had been none, its effectiveness correspondingly overstated.

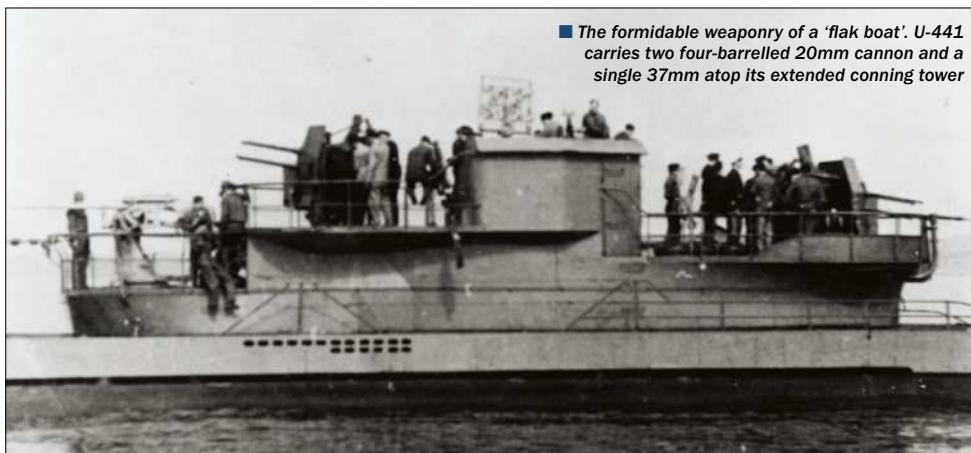
Even this false sense of optimism did not last. A series of subsequent convoy attacks failed, and German casualties mounted once again. By the end of the year, eight merchant ships and six warships had been sunk for the loss of 39 U-boats. The anticipated increased level of Luftwaffe cooperation had not materialised; improved flak weaponry had failed; radar detectors still offered no defence; and Dönitz abandoned pack operations west of the British Isles by the end of 1943.

GÖTTERDAMMERUNG – TWILIGHT OF THE GODS

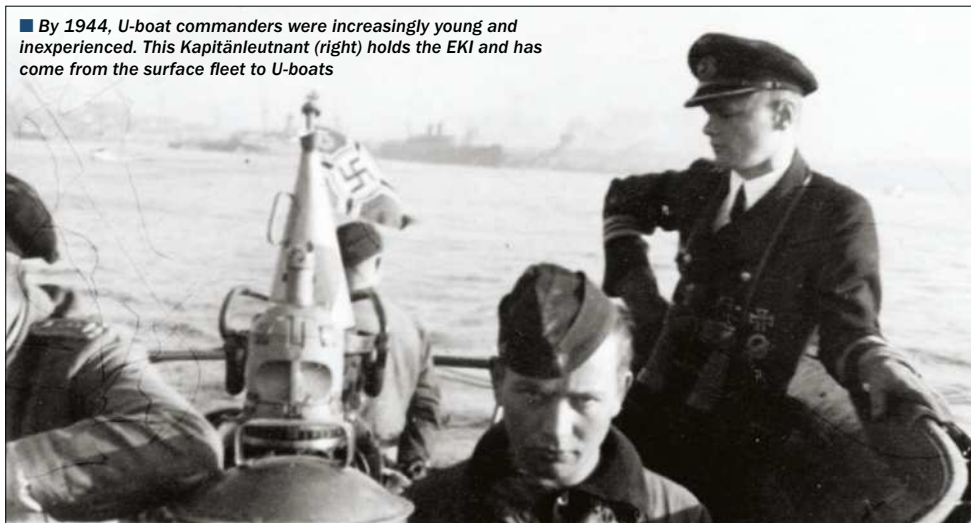
By the beginning of 1944, pack operations were no more and U-boats were hunting individually for meagre return. Newly qualified U-boat commanders were frequently undertrained and inexperienced. The 'old guard' of commanders had largely been moved ashore, killed in action, or were operating large cruiser U-boats that travelled into the Indian Ocean where they too suffered disappointment, never achieving the predicted onslaught on undefended shipping. Too few boats were in too large an ocean. Korvettenkapitän Heinrich Timm even took U-862 as far as New Zealand in early 1945, but achieved only the destruction of two Liberty ships off eastern Australia during his mission from the German base at Penang, Malaya.

Despite the installation of technological improvements, nothing could mask the fact that by 1944 the Type VII and Type IX U-boats were virtually obsolete, the core design having changed little for years. Among the developments intended to prolong use of these U-boats was the 'Schnorchel', an extendible breathing tube that allowed diesel engines to be operated while running shallowly submerged. This increased the boat's submerged speed and their ability to traverse the increasingly dangerous Bay of Biscay without surfacing, therefore hopefully avoiding detection. The device was not without its problems, superb depth-keeping required to keep the Schnorchel head valve open. If accidentally closed while

■ The formidable weaponry of a 'flak boat'. U-441 carries two four-barrelled 20mm cannon and a single 37mm atop its extended conning tower



■ By 1944, U-boat commanders were increasingly young and inexperienced. This Kapitänleutnant (right) holds the EKI and has come from the surface fleet to U-boats





“EVEN THIS FALSE SENSE OF OPTIMISM DID NOT LAST. A SERIES OF SUBSEQUENT CONVOY ATTACKS FAILED, AND GERMAN CASUALTIES MOUNTED ONCE AGAIN”

the diesels were running, air was sucked from the boat's interior by the hungry diesel engines, depressurising the internal atmosphere and potentially causing extreme pain and ear injuries to crewmen. Exhaust gases could also be vented into the boat with probable carbon monoxide poisoning issues. Furthermore, the U-boat was both deaf and blind while running submerged at speed.

Nevertheless, the urgent fitting of Schnorchels to frontline boats was carried out in Germany, Norway and France and would enable an inshore offensive to be mounted by Dönitz within British waters, beginning in September 1944. The U-boats had already shown themselves completely unsuited as anti-invasion weapons during the D-Day landings – most of those despatched to attack the Allied invasion armada had been sunk – but they momentarily threw the Royal Navy off balance by this inshore campaign as U-boats attacked merchants in shallow

waters littered with wrecks which masked their ASDIC signature to enemy surface craft. While the Germans certainly gained an immediate tactical initiative, they could never regain the strategic advantage as Hitler's Reich was losing on all fronts.

That strategic advantage also thwarted the grand design of the Type XXI electro-boat. An ambitious undertaking by the Kriegsmarine, intense Allied bombing of shipyards and attacks on the Baltic testing and training grounds successfully delayed the Type XXI's activation. Design flaws were also discovered as the U-boat was built in prefabricated sections, then assembled at a central shipyard. However, frequent use of non-maritime construction facilities resulted in strict tolerance guidelines not being met and subsequent structural weaknesses. Many of those that had begun trials were also sunk en route to Norway towards the end of the war and only one sailed on a

■ British troops approaching incomplete Type XXI U-boats in a Hamburg shipyard. Their vulnerability to Allied bombing is obvious

combat footing, for a grand total of three days, before returning to base. A coastal Type XXIII electro-boat had seen action with some measure of success. Small, nimble and fast, they were excellent U-boats, but could never hope to effect a change in German fortunes. They carried only two torpedoes – the same weapon capacity of the two-man midget submarine Seehund. Nonetheless, the last merchant ships torpedoed by U-boat of the Second World War were sunk by a Type XXIII: Norwegian steamer SS Sneland I and Canadian merchant SS Avondale Park, by U-2336 on 7 May 1945.

Dönitz became the German head of state following Adolf Hitler's suicide within his Berlin bunker, named as Reichspräsident (Reichs president) and Oberbefehlshaber der Wehrmacht (supreme commander of the armed forces), and to him fell the duty of surrendering Germany to the Allies. To the bitter end his U-boats had continued to sail, despite a terrifying casualty rate that resulted in three-quarters of men from the U-boat service being lost in action, many of them to fates that remain unknown to this day.

REMEMBERING THE BATTLE OF THE ATLANTIC

OFTEN STILL OVERLOOKED, THE STRUGGLE TO CONTROL THE WORLD ABOVE AND BELOW THE ATLANTIC OCEAN WAS THE KEY CONFLICT OF THE SECOND WORLD WAR



The Battle of The Atlantic was the longest battle of World War II. It lasted five years, eight months and five days. It also resulted in the direct deaths of over 100,000 people, around 30,000 of whom were civilian sailors who lost their lives ferrying supplies across 3,000 miles

of wild ocean from North America to Britain's beleaguered shores. In that sense, like those other protracted battles of the Second World War – Stalingrad and Leningrad – the Battle of The Atlantic was also a siege. One that needed to be endured and eventually broken to ensure the very survival of a people.

And yet, today, whenever World War II is commemorated in Britain, the contribution and sacrifice made by those who fought in one of the most hostile environments on Earth is often only mentioned in passing. Think of World War II, and the Battle of Britain or the Normandy invasion more readily spring to mind. Indeed, a piece in *The Daily Telegraph* in February 2017 listing 'The 20 Greatest Battles in British History' didn't even deem it worthy of a mention. Why is that? After all, the Battle of the Atlantic was without question the single most important confrontation of the Second World War.

From 1940 onwards, when the rest of Europe had been swallowed into Hitler's diabolical empire and Britain stood alone, the Atlantic lifeline provided by the convoys literally kept the country alive. Starvation was the single most deadliest weapon of the war. According to Dr Elizabeth Collingham, author of *The Taste of War*, it killed over 20 million people, and the Nazis used its power routinely. If the indiscriminate bombing of Britain's major cities wasn't enough to terrify the country's population into raising the white flag, then perhaps forcing them to 'die of hunger and tuberculosis on their cursed island,' as Hitler put it, would be. And the Germans got perilously close. By their own reckoning, the Nazi high

command estimated it would need to sink 150 merchant ships each month to starve the British out. By May 1942, when Dönitz's wolf packs were at the height of their powers, they were managing 146.

Britain's survival and continued opposition to Nazi Germany was historically important on several levels. Firstly, it remained a symbol of freedom against fascism, providing hope to the incarcerated peoples of Europe – a commodity in short supply during those desperate times. It was also a base from where resistance movements across the continent could be organised, assisted and to some degree armed. It also provided a foothold for the world's liberal democracies to mount raids and, eventually, a full-scale military invasion. None of this – or the liberation of Western Europe that followed – would have been possible had Dönitz's U-boat campaign succeeded in either choking Britain to death in the early stages of the war, or managed to stem the vast flow of American weapons and troops that poured into the UK from 1942 onwards.

A TECHNOLOGICAL REVOLUTION

But that's only half the story. To win the Battle of The Atlantic, the Allies had to make a giant leap forward in terms of technological advancement. Fought above and below the waves as well as in the air, this was a battle unlike any other. It was also conducted on the largest battlefield in the history of warfare – literally millions of square miles of ocean and sky. In an area so vast, detection and communication – as well as the ability to physically reach often extremely remote parts of the earth – required innovation and invention on an unprecedented scale.

From the start, the British high command had realised the key to winning the battle was to control the skies over the ocean. Such an ambition must have seemed impossible



■ Many of the troops and supplies that ended up landing on the Normandy beachheads during D-Day had begun their journey on the other side of the Atlantic

“IT REMAINED A SYMBOL OF FREEDOM AGAINST FASCISM, PROVIDING HOPE TO THE INCARCERATED PEOPLES OF EUROPE – A COMMODITY IN SHORT SUPPLY DURING THOSE DESPERATE TIMES”



— otherworldly even — and yet by 1945 the Allies were technologically advanced enough to have done just that. The evolution of flying boats such as the Short Sunderland, the Consolidated PBY Catalina, and long-range bombers such as the Consolidated B24 Liberator, meant thousands of square miles of ocean could be scoured. With many of these new aircraft capable of staying airborne for the best part of 24 hours, and by rotating patrols over the shipping lanes, that unimaginably vast air space was effectively secured.

The reason for dominating the sky above the Atlantic was ultimately, of course, to control the ocean itself — both its surface and its vast depths. To do this required the ability to 'see' as much of it as possible — whatever the conditions. It's astonishing to think that at the start of the war — above the waves at least — the most sophisticated piece of detection equipment available was a pair of binoculars. Technology, in other words, that hailed from the early 17th century and would have been familiar

to the likes of Cook and Nelson. By the end of the war, just six years later, high-functioning airborne and seaborne radar systems had been created alongside the bigger land-based networks to monitor anything that went on above the waves. Meanwhile, increasingly refined sonar based on the pioneering British ASDIC system kept watch for anything untoward that might be going on below them. For the first time in human history, in other words, the earth's skies and oceans were under widespread surveillance.

And if all that weren't enough, the Battle of The Atlantic also featured what was one of the most significant events of the entire conflict. The capture of U-110 off the coast of Iceland in May 1941 led to the seizing of an intact and up-to-date Enigma machine. At the time, few knew of the importance of this discovery, while even fewer, perhaps, were aware of the ground-breaking work being carried out by Alan Turing's code-breaking team at Bletchley Park. By using that machine and monitoring

Admiral Dönitz's regular communiqués to his U-boat commanders, Turing began to unravel their encrypted messages with his bombs — the world's first large-scale electronic programmable computers.

TURING'S LEGACY

By 1943, Turing's machines were cracking 84,000 messages a month. These messages weren't just about the location and movement of Dönitz's U-boats, either. They contained orders and information about the whole of the German war effort, putting the Allies permanently one step ahead of Axis plans. General Eisenhower's decision to go ahead with the D-Day invasion in Normandy, for example, was only finalised after Bletchley had intercepted messages that proved Hitler was convinced the invasion would actually take place at Calais. Meanwhile, decoded information secretly shared by Bletchley's German translator and Soviet spy John Cairncross helped the USSR win decisive battles on the Eastern Front; most notably the huge clash at Kursk in 1943 which effectively ended the Wehrmacht's ability to carry out offensive operations in Russia.

In fact, the work carried out by Turing and his team may have been intended to win the Battle of the Atlantic, but it can now be seen

"THE BATTLE OF THE ATLANTIC IS NOT JUST THE LONGEST BATTLE OF THE SECOND WORLD WAR, BUT ALSO ARGUABLY ITS MOST IMPORTANT. SO WHY DOES IT REMAIN SO OVERLOOKED?"

■ With Britain besieged, the country's food supply was rationed. A week's worth of groceries for an individual typically looked like this...



to have turned the entire course of the war. Its consequences were certainly enormous and far-reaching, with some modern historians going so far as to claim that it shortened the conflict by up to four years, not only saving millions of lives but, in the process, bequeathing us the digitised, computer-connected world we live in today.

The Battle of The Atlantic, then, is not just the longest battle of the Second World War, but also arguably its most important. So why does it remain so overlooked? One answer might be that because it wasn't a battle like anyone had ever seen before. It was so vast and complex – geographically, technologically, strategically and militarily – that even today it remains a difficult affair to define. It may have been identified as a single ongoing campaign by Winston Churchill as early as February 1941, when he first dubbed it the Battle of the Atlantic, but at the time few were in as elevated a position as the British prime minister: able to see all the parts that made up its sum. What went on at Bletchley Park, for example, would remain – thanks to the Official Secrets Act – unknown to all but a select few until the mid-1970s.

For most of Britain's besieged population, the convoys that brought them food and fuel were welcome and the efforts of those who risked their lives to do so appreciated. But

the reliance on such a slender supply route for survival was also deeply psychologically unsettling, a reminder of just how vulnerable and isolated the country had become. The British government knew this was the case too, making any official take on the struggle at sea a tricky story to spin – not least in the war's early years when the U-boats were so convincingly winning.

Not that it got much easier to do so once the tide started to turn against Dönitz and his marauding wolf packs. After all, their defeat was not one that could be summed up in an easy-to-grasp, guts-and-glory story. Instead, it was brought about by secret weapons and spies – things that, quite literally, couldn't be talked about openly.

This combination of complexity and secrecy has perhaps conspired to keep the Battle of the Atlantic's importance in the shadows, at least in the imagination of the British public. With each passing year, however, the pivotal role that it played in defeating Nazi Germany becomes clearer. Certainly, those who were privy to the big picture at the time knew that everything hung on winning it. As Churchill later wrote: "The Battle of the Atlantic was the dominating factor throughout the war. Never for one moment could we forget that everything happening elsewhere, on land, at sea or in the air, depended ultimately on its outcome."



■ By mid-1942, German U-boats were sinking so many Allied ships that Great Britain was on the brink of starvation

HOW CANADA RECONNECTED WITH ITS PAST

By finally acknowledging the sacrifice of its merchant sailors, Canada got to recognise the battle's profound importance

Canada, as a dominion loyal to the British crown, declared war on Nazi Germany on 9 September 1939. Despite its vast size, its population was just over 11 million and the size of its armed forces reflected that. Its navy, in particular, was tiny and ill-prepared for the challenge of looking after and manning the convoys that would make the treacherous trips across the Atlantic. In 1939, the Royal Canadian Navy (RCN) had just six ships and 3,500 personnel. By 1945, those numbers had grown to 443 and 95,000 respectively. Another 12,000, meanwhile, swelled the ranks of Canada's Merchant Navy (CMN).

Manning the North Atlantic shipping lanes was a dangerous business. Losses suffered by Canadian crews were high and over 2,000 RCN sailors were killed. The risk, however, to the sailors on merchant ships was significantly greater: 1,629 CMN personnel died during the campaign, and with one out of every seven killed or wounded, their casualty rate was proportionally higher than any of Canada's fighting services.

When the war ended, however, those who had served in the CMN were denied war-veteran benefits. This grotesque injustice, based on the fact that the CMN had been a civilian organisation, not a military one, wasn't overturned until the 1990s after decades of vociferous campaigning. The high-profile reversal by the Canadian government on this matter was to help the country reconnect with its wartime past and reassess the importance of the Battle of the Atlantic and its role in it.

In 2001, Canada declared 3 September annual Merchant Navy Remembrance Day. Then, in 2011, the Canadian government issued the following statement: "The Battle of the Atlantic was the longest-running battle of the Second World War and is proudly remembered as a Canadian triumph in helping maintain the Allies' crucial supply routes through the North Atlantic. The turning point in the battle came in May 1943, when the Allies combined their enhanced equipment on the seas and in the air with... special intelligence to gain the upper hand. The Government of Canada [will now] commemorate the anniversary of the Battle of the Atlantic each May, in recognition of Canada's significant contribution in turning the tide..."

"MANNING THE NORTH ATLANTIC SHIPPING LANES WAS A DANGEROUS BUSINESS. LOSSES SUFFERED BY CANADIAN CREWS WERE HIGH"

WHAT IF THE ALLIES HAD LOST THE BATTLE OF THE ATLANTIC?

PROFESSOR MARC MILNER HAS SPENT 35 YEARS STUDYING THE ATLANTIC WAR. WE ASK HIM WHAT MIGHT HAVE HAPPENED HAD GERMANY EMERGED VICTORIOUS

What if the Allies had lost the Battle of the Atlantic?

Britain would not have been able to carry on its war effort for very long. Britain was dependent in 1939 for at least half of its food imported from overseas, so Britain would have been in a very serious situation with regards to food. Also, Britain's economy in 1939 and 1940 is pretty much an export-based economy so to survive economically it needed to import raw material and export finished goods. It would have been virtually impossible for Britain to survive if she had not been able to use the sea. The Germans reached the French coast in the summer so Britain would have that year's harvest. If the Germans had put the squeeze on Britain in the winter of '40/'41, which they tried to do, I think it would have been a matter of weeks, perhaps months, before the British government would have had to make a decision about accommodating German requests. I don't see a great surge of Germans coming across the English Channel, at least not initially, because the Germans could not have launched an invasion at the same time that they were trying to do an effective blockade of Britain. The big question for the British would have been, apart from accommodating Hitler's wishes and succumbing to the pressure, the extent to which it would have been an occupied country. That would have been an interesting situation.

How could the Germans have won the war in the Atlantic?

Most people tell me if the Germans had had 300 U-boats in 1939 they would have won the Battle of the Atlantic. My response is always that if the Germans had had 300 U-boats, the Brits would have had 250 destroyers, sloops

and frigates. You can't change one variable and expect the others to remain unchanged. The Brits built for the threat – Germany's surface fleet. The rest could be – and was – improvised in a time of crisis. Simply put: the Germans could never have won the Battle of the Atlantic, but Britain could have lost it. The greatest threat to imports in 1940-1941 was the bombing and closure of key British ports, and that's a Luftwaffe responsibility and nothing to do with the Kriegsmarine. Many historians make a facile and erroneous link between import decline and sinkings at sea in this period, but it's just not that simple. The Germans did not have the power in 1940-41 to inflict a knockout blow at sea. 'Death by a thousand cuts' was a more plausible scenario, but even that could not be done fast enough to ensure the death of the victim. The Germans are really the engine of the Atlantic War because if the Germans don't do anything, the Allies win. It is just that simple.

So if Germany were to have won the war in the Atlantic, it would have been in the winter of 1941 when Britain was standing alone in Europe?

Yes. Someone said that Britain had 500 million people around the world backing her up, but she really is the little Dutch boy with his finger in the dyke in the winter of '41. That's the only moment when the Germans have a clear measurable, obtainable objective in the Atlantic War – and that is to blockade Britain and force her to surrender. But the problem for the Germans is that they don't have the resources to do it. One of the biggest impacts on British imports in the winter of '40/'41 is the Blitz. Most people don't associate that with



MARC MILNER

Marc Milner is Professor of History and Director of the Gregg Centre for the Study of War and Society at the University of New Brunswick, Canada. He has published extensively on the Battle of the Atlantic and the history of the Royal Canadian Navy. A contributor to the official histories of both the RCN and the RCAF in the Second World War, Milner's book *Battle of the Atlantic* won the C.P. Stacey Prize for the best book on military history in Canada in 2004. His recent work has been on the Normandy campaign, including *Stopping the Panzers: the Untold Story of D-Day*, which won the US Commission on Military History's 'James Collins Book Prize' for 2014-15.





What if Germany had won the Battle of the Atlantic and invaded Britain?

the Battle of the Atlantic. But the bombing and closure of ports along the English south and east coasts promptly cuts into British imports far more than anything that is done at sea because all of a sudden the major import harbours are closed and they have to reorient longshoremen and rolling stock and railways and the handling gear to the West Country ports and that takes almost a year to do. And the net result is a sharp decline in imports to Britain. They just don't have the port handling capability. But Germany does just not have enough submarines. In January 1941 there are only eight German submarines at sea that are operational. You can't win the Battle of the Atlantic with eight submarines. The Germans pushed out as many surface vessels as they possibly could. It is a very dangerous period for Britain in the winter of 1941 because Scharnhorst and Gneisenau, the two big battlecruisers, are loose in the North Atlantic. [Admiral] Hipper and Admiral Scheer are out in the North Atlantic. There are long-range Condors and Blohm & Voss flying-boats doing patrols. Some of the Condors are attacking shipping at sea, particularly in the eastern Atlantic. The Germans are beginning to use U-boat wolf packs and achieve some dramatic successes. But it's never quite enough. They spent the winter of 1941 pulling the lion's tail and tweaking its ears, but when the fair weather of spring comes in April and May and they send Bismarck out, it is a totally changed operational environment.

If Britain had succumbed, could America have found another staging post for its entrance into the war in Europe?

Yes. In 1942 the Allies invade French North Africa, and the landings along the Moroccan coast are staged directly from the US eastern seaboard as part of Operation Torch. So the way back into Europe would have been, in some ways, the way that NATO subsequently planned to get back into Europe should Western Europe and Great Britain fall to the

Soviet Union. That is to work their way through North Africa and through the Iberian Peninsula.

Presumably, though, without Britain as an ally, America might not have declared war on Germany in December 1941?

From what we know of the Americans in 1939-41, it is not clear whether the Americans might have made an accommodation with the new regime in Europe and lived with it. America had not begun to mobilise, seriously, by the summer of 1941. It was still building up its fleet and the infrastructure for the huge army that would appear in Europe in 1944. It is just not in place

at this time, so I think America would have had to make a serious decision. My best guess – and it can be no more than that – is that they would have made an accommodation with Nazi Europe and made every effort to make sure that Britain was as far as they got [on their westward expansion].

If Britain had fallen, might Churchill have been able to continue fighting from bases in Canada and other parts of the Empire and Commonwealth?

Canada has declared war against Nazi Germany, not as part of the British Empire



■ Allied tanker Dixie Arrow, torpedeed by U-71, in 1942

COMPARING REAL AND ALTERNATIVE SCENARIO TIMELINES

REAL TIMELINE

- **PEARL HARBOR ATTACKED**
DECEMBER 1941
Carrier-based Japanese aircraft launch their surprise strike on the US Pacific Fleet. A day later, the United States declares war on Japan. Three days after this, the US declares war on Germany.

- **THE HAPPY TIME BEGINS**
DECEMBER 1941
U-boats carry the war to America's eastern seaboard and enjoy huge success as the US Navy fails to organise effective convoys, resulting in the loss of thousands of tonnes of vital shipping.

ALTERNATE TIMELINE

- **THE OUTBREAK OF WAR**
SEPTEMBER 1939
Only 27 of Germany's 57 U-boats are capable of long-range Atlantic operations. Germany's Z-plan aims to build 300 U-boats, enough to strangle Britain. It takes a further 20 months to reach this tally.

- **CAPTURE OF FRENCH ATLANTIC PORTS**
JUNE 1940
U-boats now enjoy easy access to the eastern Atlantic. Despite the delineation of a neutral zone where American ships will sink marauding subs, the Germans soon extend operations to the central and western Atlantic.

- **ARCTIC OPERATIONS BEGIN**
JUNE 1941
When Britain begins running supplies of raw materials and finished hardware to Russian ports under the Lend-Lease deal, U-boats, shore-based aircraft and surface vessels commence operations in Arctic latitudes.

but as an independent, self-governing nation. So it is conceivable that the war would have continued. There were certainly plans to move the British fleet to Canada, and ports along the Canadian east coast were surveyed to see just where the Royal Navy could shelter. So the question becomes, does Britain capitulate like the French did and make accommodation, or does the British government go into exile and continue the war from the Empire and the Commonwealth? That would also change the situation for the Americans.

And if Britain had fallen in 1941, how would that have affected Russian resistance to Nazi Germany? Russia relied heavily on British hardware, initially at least...

The assumption, of course, is that Britain would have fallen in the spring of 1941 because it is difficult to figure the scenario before or after

that. And by then Brits have already signed the Lend-Lease deal and are already transshipping vast amounts of goods destined for Britain like American fighters, P40-Warhawks and Tomahawks, straight to Russia. Britain is also sending a large number of its tanks to Russia in the Fall of 1941. I have read recently that perhaps as much as upwards of 40 per cent of the tanks that stand between the Germans and Moscow in the first week of December 1941 were Matildas and Valentine tanks from British factories. If that's the case, there is a very narrow window in which

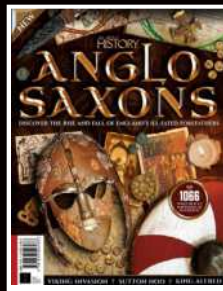
British production and British Lend-Lease material, including Hurricane fighters, get to Russia just at the most critical moment of the German advance on Moscow. And many historians assume – though I don't know that it's a fair assumption – that had Moscow fallen, the Soviet Union would have capitulated. I am not entirely convinced of that but, if so, then the British aid to the Soviet Union in the fall of 1941 might well have been one of the most singular, decisive things that Britain did to ensure the Allied victory in the Second World War.

“THE QUESTION BECOMES, DOES BRITAIN CAPITULATE, OR DOES THE BRITISH GOVERNMENT GO INTO EXILE AND CONTINUE THE WAR FROM THE EMPIRE AND THE COMMONWEALTH?”

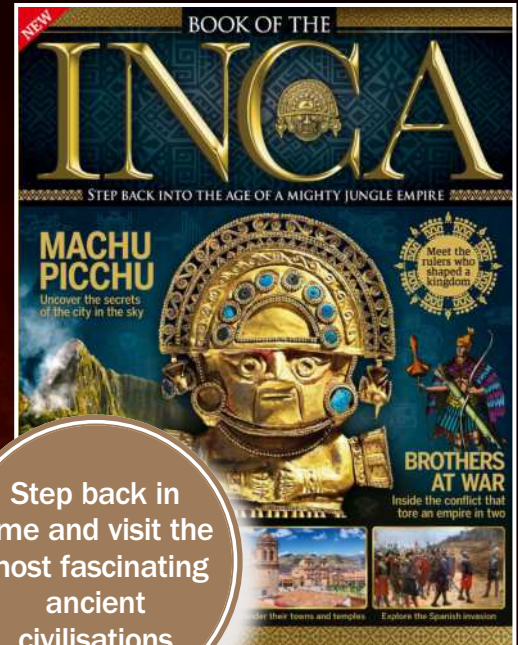


■ German U-boat bases in France were hundreds of miles closer to the Atlantic than the bases on the North Sea

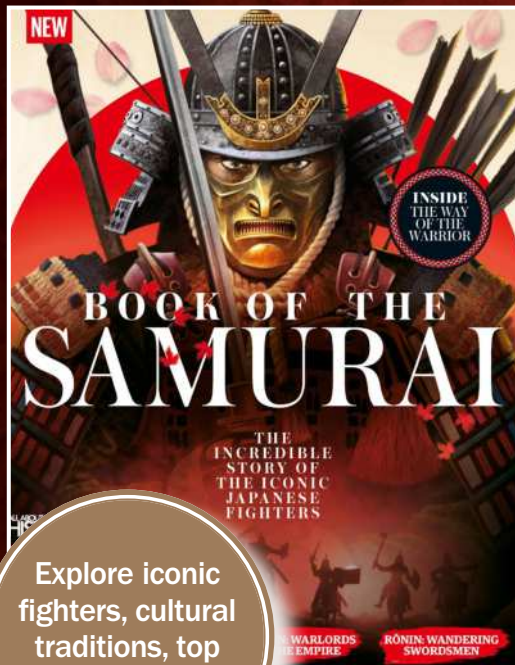
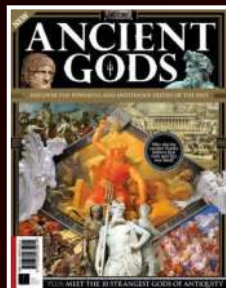
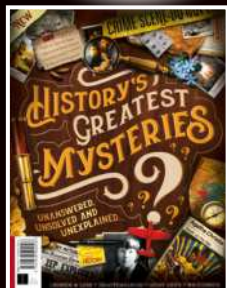
- **STALINGRAD COMES TO AN END**
FEBRUARY 1943
Arguably the single most crucial battle of the European war concludes with Germany's defeat in the ruins of Stalingrad. Thousands of German troops become POWs.
- **THE LONGEST DAY**
6 JUNE 1944
Germany is stretched to breaking point as Allied forces, including a vast American army, launch D-Day operations with the invasion of Normandy.
- **HITLER COMMITS SUICIDE**
APRIL 1945
The war in Europe nears its end as Hitler takes his own life in his Berlin bunker shortly before the Red Army arrives. Unconditional surrender follows a week later on 7 May.
- **THE US DROPS THE BOMB**
AUGUST 1945
World War II nears its end after a B-29 bomber drops the world's first deployed atomic bomb on Hiroshima, destroying 90 per cent of the city and instantly killing 80,000 people.
- **ROYAL NAVY MOVES TO CANADA/CEYLON**
AUGUST 1941
Churchill relocates the Royal Navy to Halifax in Canada, and Trincomalee in Ceylon, the only Empire-Commonwealth ports capable of handling such warships.
- **THE ALLIES TAKE NORTH AFRICA**
NOVEMBER 1942
British Empire forces in Africa, supplied via the Suez Canal, have taken control of the continent. The invasion of Italy is planned.
- **SECOND BATTLE OF MOSCOW**
MARCH 1943
The German Sixth Army takes Stalingrad and Hitler launches second assault on Moscow. Yet Russia still stands.
- **D-DAY LAUNCHES VIA IBERIAN PENINSULA**
JUNE 1944
The Iberian peninsula becomes the staging post for the Allied push into Western Europe.
- **Z-PLAN HITS TARGET**
JUNE 1941
The Kriegsmarine beefs up production and hits its target of 300 U-boats, with most capable of long-range Atlantic voyages. The blockade of British ports puts enormous pressure on Churchill.
- **BRITAIN FALLS TO THE REICH**
NOVEMBER 1941
With food supplies dwindling and the U-boat wolf packs emerging pre-eminent in the Atlantic, the British government goes into exile to continue the war from the Empire.
- **THE US DECLINES GERMANY DEAL**
DECEMBER 1941
Roosevelt strongly considers negotiations with Nazi Germany, but pressure from Britain, Canada and Hitler's early success in Russia prompts him to enter the war in Europe.
- **D-DAY PREPARATIONS BEGIN IN EARNEST**
JANUARY 1943
Operation Torch is no longer a requirement given Allied success in Africa. American GIs begin arriving in Morocco and Algeria in preparation for a strike at mainland Europe.
- **LIBERATION OF GREAT BRITAIN**
FEBRUARY 1944
With his forces stretched thin following defeat at Kursk, Hitler withdraws from mainland Britain in a bid to shore up his defences in France. Churchill returns to Whitehall.



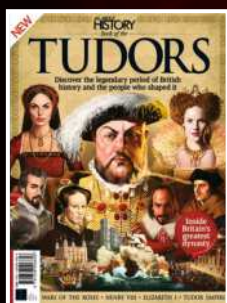
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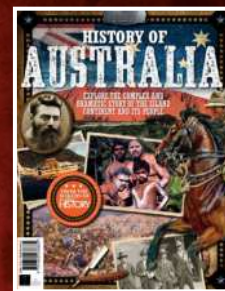
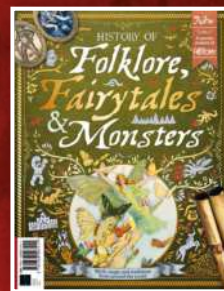
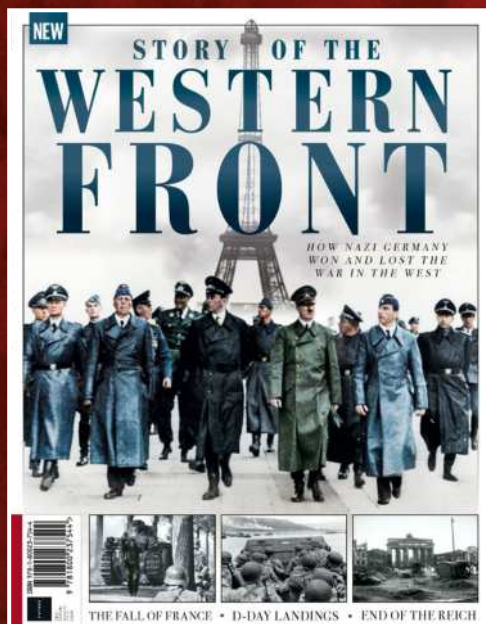
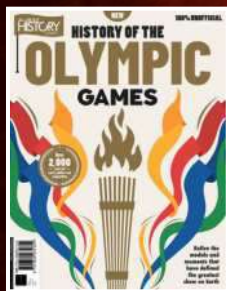
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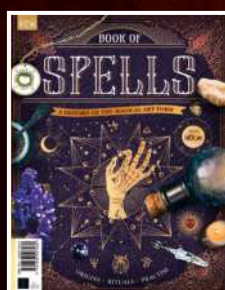
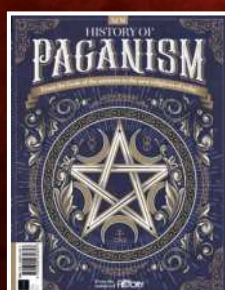
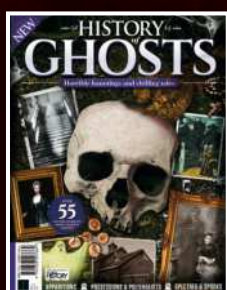


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